

PROJECT MANUAL / SPECIFICATIONS

KATONAH-LEWISBORO UNION FREE SCHOOL DISTRICT

60 North Salem Road, Cross River, NY 10518

ADDITIONS AND ALTERATIONS AT MEADOW POND ELEMENTARY SCHOOL

185 Smith Ridge Road, Route 123, South Salem, NY 10590

SED No. 66-01-01-03-0-007-016

ARCHITECT

KG+D ARCHITECTS, PC

285 Main Street, Mount Kisco, NY 10549

www.kgdarchitects.com

914.666.5900

MECHANICAL ENGINEER

BARILE GALLAGHER & ASSOCIATES

39 Marble Avenue, Pleasantville, NY 10570

www.bga-eng.com

STRUCTURAL ENGINEER

THE DISALVO ENGINEERING GROUP

90 Lake Avenue, Suite 201, Danbury, CT 06810

www.tdeg.com

CIVIL ENGINEER

INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, PC

3 Garrett Place, Carmel, NY 10512

www.insite-eng.com

ENVIRONMENTAL ENGINEER

ADELAIDE ENVIRONMENTAL HEALTH ASSOCIATES, INC.

1511 Route 22, Suite C24, Brewster, NY 10509

www.adelaidellc.com

SPECIFICATION CONSULTANT

SUSAN B. MCCLYMMONDS, AIA

200 Robb Road, Amsterdam, NY 12010

ISSUE FOR BID

22 MARCH 2024

THE UNDERSIGNED CERTIFIES THAT TO THE BEST OF HIS KNOWLEDGE, INFORMATION AND BELIEF, THE PLANS AND SPECIFICATIONS ARE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF THE NEW YORK STATE UNIFORM FIRE PREVENTION AND BUILDING CODE, THE STATE ENERGY CONSERVATION CONSTRUCTION CODE, AND BUILDING STANDARDS OF THE EDUCATION DEPARTMENT, AND THAT THE PLANS AND SPECIFICATIONS REQUIRE THAT NO ASBESTOS CONTAINING MATERIAL SHALL BE USED.

Russell Davidson, FAIA

KG+D Architects, PC

285 Main Street, Mount Kisco, New York 10549

914.666.5900 kgdarchitects.com

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ADVERTISEMENT FOR BIDS

The ***Katonah-Lewisboro Union Free School District*** will receive individual sealed proposals at the District Office, 60 North Salem Road, Cross River, NY 10518, for the project identified below. All proposals that have been received in accordance with the terms hereof will be opened and read aloud at the time and place of the Bid Opening.

ADDITIONS AND ALTERATIONS AT MEADOW POND ELEMENTARY SCHOOL

SED No. 66-01-01-03-0-007-016

BID # 14-23/24

Katonah-Lewisboro Union Free School District

60 North Salem Road, Cross River, NY 10518

Documents Available to Bidders:	March 22, 2024, 3:00 PM
Pre-Bid Site Meeting:	April 3, 2023, 2:30 PM
Bid Opening:	April 17, 2023, 1:00 PM

Contracts:	1 – General Construction
	2 – Plumbing Construction
	3 – Mechanical Construction
	4 – Electrical Construction

Complete 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. Complete digital sets of Bidding Documents may be obtained online as a download at the following website: revplans.biddyhq.com. Follow instructions to create an account or login if already registered. All bidders are urged to register to ensure receipt of all necessary information, including Bid Addenda.

Complete hard copy sets of Bidding Documents may be obtained from REVplans upon depositing the sum of \$100 per set. Deposit checks or money orders shall be made payable to *Katonah-Lewisboro Union Free School District*. 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 for 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 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.

Each bid proposal must be accompanied by a certified check payable to *Katonah-Lewisboro UFSD* or by a Bid Bond for a sum equal to ten percent (10%) of the bid, as set forth in the Instructions to Bidders. All bid security, except those of the three low bidders for each prime contract will be returned within four days after the bid opening. The bid security provided by the three low bidders for each prime contract will be returned after execution of the Contract(s).

There will be a **pre-bid site meeting** on **April 3, 2023, at 2:30 PM**, commencing at the Main Entrance of the Meadow Pond Elementary School, 185 Smith Ridge Road / Route 123, South Salem, NY 10590. **Bidders are urged to attend the pre-bid site meeting. Knowledge of the field conditions is crucial to understanding the Work.**

Attention is called to the Owner's sales tax exemption, the requirements as to conditions of employment to be observed, and the minimum wage rates to be paid under the contract. In addition, the Bidding Documents for this project contain detailed requirements for the qualification of Bidders. These include insurance requirements, financial statements, bank references, lists of lawsuits, arbitrations, or other proceedings in which the Bidder has been named as a party, and a description of other projects of similar size and scope completed by Bidder.

All Requests for Information must be sent in writing to the Architect via email (Richard Markgraf, markgraf@kgdarchitects.com) no later than 5 business days prior to bid opening.

The Owner requires 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.

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 Owner.

Proposals (including all required attachments) shall be submitted in a sealed, opaque envelope (First Envelope) distinctly marked on the outside as follows:

Katonah-Lewisboro Union Free School District
ADDITIONS AND ALTERATIONS AT MEADOW POND ELEMENTARY SCHOOL
BID #14-23/24
April 17, 2024, 1:00 PM
Contract Number & Construction Type
Name of Bidder
Marked "BID PROPOSAL"

Bid Qualifications shall be submitted in a sealed, opaque envelope (Second Envelope) distinctly marked on the outside as follows:

Katonah-Lewisboro Union Free School District
ADDITIONS AND ALTERATIONS AT MEADOW POND ELEMENTARY SCHOOL
BID #14-23/24
April 17, 2024, 1:00 PM
Contract Number & Construction Type
Name of Bidder
Marked "BID QUALIFICATIONS"

The Owner will not open or consider any proposal delivered after 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

INSTRUCTIONS TO BIDDERS

To be considered, Bids must be made in accordance with these Instructions to Bidders.

1. PROJECT DESCRIPTION

The Project consists of performing Additions and Alterations at the Meadow Pond Elementary School for the Katonah-Lewisboro Union Free School District as shown on the Contract Drawings and described in the Specifications.

1. The scope of the Work of this project is selective demolition of interior construction and select portions of exterior walls to allow for selective renovations to the building interior spaces including the Library, STREAM Lab, Wingspaces, and miscellaneous spaces, and adding a security entrance and lobby addition.
2. The Work will be performed at the Meadow Pond Elementary School located at 185 Smith Ridge Road, South Salem, NY 10590.
3. The Contract Documents shall consist of (a) the project specifications, including these instructions to Bidders; b) the Owner-Contractor Agreement; c) the General Conditions of the Contract for Construction; and d) the successful bidder's bid

2. TYPE OF CONTRACTS

The Work of this Project will be let in four (4) separate contracts divided according to the work of the separate Prime Contractors for the following:

1. Contract No. 1 - General Construction Work
2. Contract No. 2 - Plumbing Work.
3. Contract No. 3 - HVAC Work
4. Contract No. 4 - Electrical Work

Responsibilities assigned to each separate Prime Contractor and the scope of the Work included in each contract is clearly identified in the Specifications.

3. TIME SCHEDULE

It is the intent of the Owner to award the Contracts for the Work on or about two (2) weeks after receipt of bids. Immediately upon receipt of Notice of Award of Contract from Owner, Contractors shall begin preparing required bonds, insurance certificates and other required submittals. Work may be performed at the building and site only upon receipt of written authorization (Notice to Proceed) from Owner and after the approval of the required submissions.

The anticipated Notice to Proceed/start of construction date is as indicated in the Project Milestone Schedule included at the end of Section 011000 "Summary."

The Work shall be Substantially Complete on or before the date(s) indicated in the Project Milestone Schedule included at the end of Section 011000 "Summary." Time is of the

essence, as it is extremely important that the Owner assume its full use of the buildings and sites no later than the completion date(s) specified.

4. QUALIFICATIONS OF BIDDERS

The Owner may make such investigation as it deems necessary to determine the responsibility of any bidder or to determine the ability of any bidder to perform the Work. The Owner reserves the right to disqualify any prospective bidder or to reject any bid.

5. DOCUMENTS

Bidders may obtain the Bid Documents after 3:00 PM on Friday March 22, 2024, from REVplans, 28 Church Street, Unit 7, Warwick, NY 10990; 845-651-3845. Complete digital sets of Bidding Documents may be obtained online as a download at the following website: (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, drawings and specifications, may be obtained upon depositing the sum of \$100.00 for each combined set of documents. Checks or money orders shall be made payable to Katonah-Lewisboro Union Free School District. The deposit of \$100.00 per set for the first set is refundable as per NYS General Municipal Law Article 5A Section 102. Deposit, for initial sets, will be refunded to all qualified bidders returning plans and specifications in good condition within 30 days following the award of the Contract or rejection of that bidder's Bid.

Additional copies of the documents will be available from the designated printer and at the non-refundable cost of reproduction.

Any bidder requiring documents to be shipped shall make arrangements with the printer and pay for all packaging and shipping costs.

Please note REVplans (revplans.biddyhq.com) is the designated location and means for distributing and obtaining 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 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.

6. DEPOSITS

Bidders' deposits will be refunded if the set is returned in good condition within thirty (30) days following the award of the contract or rejection of the bids.

7. EXAMINATION

Bidders shall carefully examine the Bid Documents and the existing building and site to obtain first-hand knowledge of existing conditions and to verify conditions under which work will be performed. Failure to do so will not relieve a successful bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the Contract Documents and to complete the contemplated work for the construction set forth in his bid. Submission of a Bid will be considered conclusive evidence that a bidder has visited the site and is conversant with local facilities and difficulties, the requirements of the Contract Documents, applicable laws and codes, the state of labor and material markets, and has made due allowance in his bid for all contingencies that may arise, whether or not stated.

8. QUESTIONS

Should a bidder find discrepancies in, or omissions from the drawings or any Contract Documents, or should it be in doubt, as to their meaning, or should it find provisions of any law or applicable code conflicting with provisions of the Contract Documents, it shall at once notify the Architect in writing, who will endeavor to issue the necessary clarifications or revisions to prospective bidders by means of an Addendum. Such Addendum, as part of the Contract Documents, shall be binding on all bidders. It shall be the duty of each bidder to make certain that it has received or provided himself with copies of all Addenda. Bids will be conclusively presumed to be based upon all Addenda issued up to the time of the opening of Bids, regardless of whether or not a copy of each Addendum is actually in the possession of the bidder.

Prospective bidders may request clarifications of the Bid Documents from the Architect by contacting Richard Markgraf at KG + D Architects, PC, via e-mail to rmarkgraf@kgdarchitects.com. All questions must be submitted in writing, no phone calls will be accepted. All correspondence must be addressed to subject line "Additions and Alterations to Meadow Pond Elementary School".

Inquiries received over the phone will not be answered. All information will be relayed to bidders by written addenda. Neither the Owner nor the Architect will be responsible for any oral instruction or clarification to any persons whatsoever. Questions received less than five (5) calendar days prior to the bid opening date cannot be answered.

If a bidder, prior to submitting a Bid, fails to give notification to the Architect of the existence of any such discrepancies, omissions, ambiguities, errors, or conflicts, he shall comply with the interpretations or directions given by the Architect in resolving same, without claiming extra costs

9. INTERPRETATION OF BID DOCUMENTS

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.

10. PRE-BID MEETING

A pre-bid meeting will be held on Wednesday, April 3, 2024 at 2:30 PM at the main entrance to the Meadow Pond Elementary School located at 185 Smith Ridge Road, South Salem, NY 10590. Attendance at the prebid meeting is not mandatory for submitting a bid but is strongly encouraged.

It is the bidder's responsibility to examine carefully the plans and specifications, proposal and the site upon which the work is to be performed. By submitting its bid, the bidder represents that it has made such examination and is familiar with all of the conditions and requirements of the Project.

11. PREPARATION OF BIDS

Each Bid must be completed in duplicate on the applicable Bid Form(s) provided herein. All blank spaces must be filled in with ink in both words and figures. Erasures or other changes in a proposal must be explained or noted over the signature of the bidder. The Bid shall be signed by person or persons legally authorized to bind Bidder to Contract.

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

1. Certified check or Bid Bond in the amount totaling ten percent (10%) of the base bid.
2. Certified letter from Bonding Company, indicating that they meet the criteria set forth in Article 11 of the General Conditions.
3. One (1) original and one (1) copy (clearly marked "copy") proposal forms.
4. Certified letter that the company bidding this project has been in business under the same name for a period of five (5) years or longer, and is not currently disbarred from bidding or working on public works projects by the New York State Department of Labor.
5. Original fully executed non-collusive form.
6. In accordance with the requirements of the General Municipal Law Section 103-g, the bidder is required to include 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". These forms are included in the Bid Documents.
7. Executed insurance coverage certification.
8. Executed sexual harassment prevention certification.

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

1. Fully completed statement of bidder's qualifications.
2. A description of its experience with projects of comparative size, complexity and cost together with documentary evidence showing that said projects

were completed to the Owner's satisfaction and were completed in a timely fashion.

3. Documentation evidencing the bidder's financial responsibility, including a certified financial statement

All blank spaces on all attachments to the Bid Form must be filled in with ink in both words and figures.

Any Bid submitted contrary to requirements above or specified, or containing omissions, conditions, or irregularities of any kind may be rejected by the Owner.

12. BID SECURITY

Each bid must be accompanied by a Bid Security made payable to Katonah-Lewisboro Union Free School District in the amount of ten percent (10%) of the Bid Sum (the sum of the Base Bid plus all Add Alternates). The Bid Security shall be either a certified bank check payable to payable to Katonah-Lewisboro Union Free School District or a Bid Bond issued by a surety company licensed to conduct business in the State of New York on the form included herein (AIA Document A310). The Bid Bond must be issued by a surety which meets the requirements set forth in the General Conditions. The successful bidder's security will be retained until it has signed the Agreement and furnished required Performance and Payment Bonds. The Owner reserves the right to retain the security of the three lowest bidders for each contract until the successful bidder enters into the contract, or until 45 days after the bid opening, whichever is longer. All other bid security will be returned within 4 days after the bid opening. Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

13. PERFORMANCE AND LABOR AND MATERIAL BOND

The successful bidder shall provide a Performance Bond and Payment Bond made payable to Katonah-Lewisboro Union Free School District, each in an amount at least equal to one hundred percent (100%) of the Contract Price as security for the faithful performance of its Contract and for payment of all persons performing labor and furnishing materials in connection with the project. The value of each bond shall be adjusted during the Project construction period to reflect changes in the Contract Sum. All Bonds must meet or exceed the requirements set forth in the General Conditions. Provide such bonds simultaneously with the execution of the Contract. Bonding company and bond must be approved by the Owner. Only surities licensed to do business in the State of New York may be used.

14. SUBMITTAL

Submit each Bid in an opaque, sealed envelope. Identify the envelope with: (1) project name, (2) name of bidder, (3) Contract name (e.g. Contract No. 1 - General Construction Work) and (4) proposal opening date. Submit Bids in accordance with Advertisement for Bids and with these Instructions to Bidders. If forwarded by mail, the Bid must be enclosed in another envelope and forwarded to the Owner by certified mail or tracked delivery at the address indicated in the Advertisement for Bids. The bidder assumes the risk of any delay in the mail or in handling of the bid by the Owner. The bidder assumes full responsibility

for having his bid deposited on time and to the location and person indicated in the Advertisement for Bids, regardless of the method of delivery.

15. MODIFICATION AND WITHDRAWAL

No oral, facsimile, or telephonic proposals or modifications of Bids will be considered. Bids may be modified at any time prior to bid opening by submitting to the Owner a written modification, enclosed in a sealed opaque envelope, signed by the bidder, or an officer thereof if the bidder is a corporation, clearly setting forth in what respects the Bid is to be modified. Except as otherwise provided by law, negligence on the part of the bidder in preparing his Bid confers no right for the withdrawal of the Bid after it has been opened. No bidder may withdraw its Bid for forty-five (45) days after the opening thereof, except as provided by General Municipal Law § 103(11).

16. REJECTION OF BIDS

The Owner reserves the right to reject any and all Bids. The Owner reserves the right to reject any Bid for reasons including, but not limited to, the following:

- a. The bidder fails to furnish any portion of the information required pursuant to the Instructions to Bidders.
- b. The bidder mis-states or conceals any material fact.
- c. The Bid does not strictly conform to law or to requirements of the Contract Documents.
- d. The Bid is conditional.
- e. The Bid is incomplete (by reason of, for example, failure to fill in an alternate price or failure to submit required documentation described herein).
- f. The Bidder is deemed unqualified to undertake the work.

The Owner reserves the right, however, to waive any informalities in the Bids received when such waiver is deemed to be in its interest.

17. OPENING AND AWARD

Bids will be opened as stated in the Advertisement for Bids. The Owner will award the Contract, if at all, on or about two weeks after receipt of bids.

The Owner reserves the right to accept Alternates in any order or combination and to determine the low bidder on the basis of the sum of the Base Bid and Alternates accepted.

18. EXECUTION OF CONTRACT

After the Owner has ascertained the successful bidder, it shall send a Notice of Award of Contract to bidder to whom a Contract has been awarded.

The Contract used for this project shall be the Owner-Contractor Agreement in the form included in the Contract Documents.

The successful bidder shall execute the contract within ten (10) days of receipt of the Notice of Award. Notwithstanding the foregoing, the bidder acknowledges that its bid is an offer to contract and that the Owner's award is an acceptance of the bidder's offer, thereby creating a binding agreement.

In the event the successful bidder fails to execute the contract or perform its work in accordance with the same, the Owner reserves the right to retain the Bid Security and apply it toward the damages incurred by the Owner for such failure.

19. SUBCONTRACTORS

All Subcontractors must be acceptable to the Architect and/or Owner. The Bidder shall submit the names of the Subcontractors proposed for use on the Project and all other information concerning his Subcontractors as requested by the Architect and/or Owner within the time frame stipulated. If the Architect and/or Owner disapproves any proposed Subcontractor the contractor shall submit the name of an alternate Subcontractor to whom the Architect and/or Owner has no objection in the same manner as the original submittal.

The Owner reserves the right to reject any bid if the names of the proposed Subcontractors are not submitted as required.

20. SALES AND COMPENSATING USE TAXES

The Owner is exempt from paying sales and compensating use taxes of the State of New York and of cities, counties, and other subdivisions of the State on all materials sold to it pursuant to the provisions of this Contract. These taxes are not to be included in bids. This exemption shall apply to supplies and materials which are incorporated in such project. and any necessary changes shall be adjusted as provided in the contract This exemption does not, however, apply to equipment rentals, small tools, and supplies for equipment such as supplies of gasoline used in operating trucks. The term "materials" as used in this article shall include supplies incorporated in this project. A Tax Exemption Certificate will be furnished to the Contractor by the Owner upon request.

21. LAWS AND REGULATIONS

All applicable State Laws, municipal ordinances, and the rules, regulations and ordinances of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full.

If the Contractor observes that the drawings and specifications are at variance with laws and regulations, it shall promptly notify the Architect in writing and any necessary changes shall be adjusted as provided in the contract for changes in the work. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules, regulations or specifications, or local, state or federal authorities without providing such notice to the Architect, the Contractor shall bear all costs arising therefrom.

22. AFFIRMATIVE ACTION PROVISION

During the performance of this Contract, each Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, age or disability. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoffs or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Each Contractor agrees to include, or require the inclusion of the above provision in any subcontract made pursuant to its contract with the Owner.

23. EQUIVALENCY CLAUSE

Whenever a material, article, device, piece of equipment or type of construction is identified on the Drawings or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalog numbers, or similar specific information, it is so identified for the purpose of establishing a standard of quality, and such identification shall not be construed as limiting competition. Any material, article, device, piece of equipment or type of construction of other manufacturers or vendors that will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article, device, piece of equipment or type of construction so proposed is completely described in submittals to the Architect and is, in the opinion of the Architect, of equal substance, appearance, and function. If the contractor desires to use any kind, type, brand, or manufacturer or material other than those named in the specifications, they shall indicate in writing, when requested, and prior to award of contract, what kind, type, brand, or manufacturer is included in the base bid for the specified item, following procedures specified in Section 016000. Refer to Division 01 General Requirements (Section 016000) and General Conditions of the Contract for Construction.

24. PAYMENT/ACCOUNTING AND EMPLOYMENT REQUIREMENTS

Contractor shall comply with the latest NYSDOL requirements, including all posting requirements, minimum wage requirements and all other requirements.

Prevailing Wage Rates: The New York State Department of Labor PRC number assigned to this project is PRC# 2023010208. Current Wage Rate Schedules can be found here:

To access the PDF file of your schedule, click on the following link or copy and paste into your browser, type in the PRC number, and click in the Wage Schedule button.

<https://apps.labor.ny.gov/wpp/doFindProject.do>

NYSDOL Requirements for OSHA 10 Compliance: The Contractor shall certify that every worker employed for this project has completed an OSHA 10 safety training course prior to performing any work on the project. Valid proof of completion of the OSHA 10 training course includes copies of bona fide course completion card and training roster, attendance record, or other documentation from the certified trainer. Simply attesting that all employees have completed the course is not sufficient proof of completion.

25. 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. 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 for each contract shall furnish within three (3) working days after the bid opening four (4) copies of the following information in writing:
 - 1. The names, addresses and phone numbers of the subcontractors and suppliers that the bidder proposes to use on the project
 - 2. A bar chart schedule showing the bidders' proposed plan and schedule to complete the bidder's work in accordance with the milestones outlined in the Contract Documents. The schedule shall incorporate all critical path items and any time sensitive material order and delivery dates.
 - 5. 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.
 - 8. A list of proposed substitutions.
 - 9. The name, cell phone number and e-mail address of the firm's project manager assigned to this project.
- C. After receipt of the above information, the Architect will designate a time and place for a meeting between the Owner, the Architect 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 a similar 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 Contract within ten (10) days after receiving notice of acceptance.
- 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.

22 March 2024
Issued for Bid

Katonah-Lewisboro Union Free School District
Additions and Alterations to Meadow Pond Elementary School
SED No. 66-01-01-03-0-007-016

END OF INSTRUCTIONS TO BIDDERS

INFORMATION AVAILABLE TO BIDDERS

1.1 GENERAL

- A. Hazardous Material Information: Data in hazardous material investigation reports included herein are provided to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between sampling locations. The Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.



1511 Route 22, Suite C24
Brewster, NY 10509 845.278.7710
69 State Street, 13th Floor
Albany, NY 12207 518.874.0617
1967 Wehrle Drive, Suite One
Buffalo, NY 14221 716.402.4580
E-mail: adelaidemail@adelaidellc.com
Fax: 845.278.7750

**LIMITED RENOVATION SURVEY
FOR
ASBESTOS-CONTAINING MATERIALS, LEAD-BASED PAINT & PCBs**

PERFORMED AT:

Meadow Pond Elementary School
185 Smith Ridge Road
South Salem, New York 10590
Adelaide Project# KGD-RM:23164.05-IN
SED# 66-01-01-03-0-007-016

PREPARED FOR:

Richard Markgraf, Assoc. AIA
KG&D Architects, PC
285 Main Street
Mount Kisco, New York 10549

PREPARED BY:

Philip J. Page
August 16, 2023

REVIEWED BY:

A handwritten signature in blue ink, appearing to read "Stephanie A. Soter".

Stephanie A. Soter
President

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1.0 Introduction

1.1 Scope of Work / Project Personnel

Adelaide Environmental Health Associates, Inc. (**Adelaide**) performed an Asbestos, Lead and PCB Survey for Building/Structure Demolition, Renovation, Remodeling and/or Repair, in conformance with ALL Federal, State and Local regulations for KG&D Architects, PC:

SURVEY LOCATION(S):	Meadow Pond Elementary School 185 Smith Ridge Road, South Salem, New York 10590
SURVEY DATE(S):	July 24, 2023 & August 4, 2023
SCOPE OF WORK:	Alterations Bond Work
SCOPE OF WORK BUILDING/ STRUCTURE PLANS UTILIZED:	Prepared by: KG+D Architects, PC Consolidated Design Set Dated: June 05, 2023
CERTIFIED ADELAIDE PERSONNEL:	Philip J. Page (NYS Asbestos Inspector/Cert. #12-10888 and EPA Lead-based Paint Inspector/Cert. #LBP-I-1172697-1)
SITE CONTACT(S):	Steve (head custodian)

1.2 Executive Summary

On July 24, 2023 and August 4, 2023, **Adelaide** inspected various areas throughout the school that will be affected by the proposed scope of work for suspect ACM, LBP and PCBs.

SUSPECT HAZARDOUS MATERIAL	SAMPLE(S)/LAYER(S)/ READING(S) COLLECTED	SAMPLE(S) / HOMOGENEOUS AREA(S) IDENTIFIED POSITIVE
Asbestos-containing Materials (ACM):	49	1
Lead-based Paint (LBP):	37 (plus calibrations)	0
PolyChlorinated Biphenyls (PCB):	3	2

NOTE: The flooring in the cafeteria was abated in 2017 with non-ACM floor tiles installed. The roofs of the entire school were abated, and non-ACM EPDM roofs were installed. The hallway flooring is newer sheet flooring over identified ACM 9x9 floor tile.

There are **asbestos materials that will be impacted** by this scope of work as described in section 1.1. These materials are listed in section 2.1.

1.3 Conclusions and Recommendations

The following conclusions and recommendations are prepared by **Adelaide** as per the provided scope of work for Building/Structure Demolition, Renovation, Remodeling and/or Repair. Should the scope of work change, it is recommended that the findings be revisited to determine if additional sampling will be required to satisfy ALL Federal, State and Local regulations.

The materials sampled, as part of this survey, were limited to building materials potential affected by the provided scope of work only. All building materials outside the scope of work that have the potential to be disturbed, impacted, or if the scope of work is to change, are to be presumed asbestos-containing materials (PACM). Identified PACM **must** either be sampled by a licensed NYS Asbestos Inspector and/or abated/removed and disposed of by a licensed NYS Asbestos Abatement Contractor.

1.4 Asbestos-containing Materials (ACM)

- This survey concluded that the materials listed in Section 2.1 tested ***positive for asbestos***.
- There are asbestos materials that will be impacted by this scope of work. These materials are listed in section 2.1. Refer to Appendix A for the approximate location of the above materials in the affected scope of work.
- Subpart 56-5(h) of 12 NYCRR Part 56 requires that no demolition, renovation, remodeling, or repair work be commenced by any owner or the owner's agent prior to the completion of asbestos abatement. Asbestos abatement must be performed by an asbestos abatement contractor that maintains a current asbestos handling license and employs NYSDOL/NYCDEP certified asbestos handlers and supervisors. It is recommended that a 12 NYCRR 56 certified Project Monitor oversee abatement activities.
- Subpart 56-5(g) of 12 NYCRR Part 56 specifies requirements for transmittal of asbestos survey information by the owner or owner's agent. (1) One copy of the asbestos survey report shall be sent to the local government entity charged with issuing a permit for such demolition, renovation, remodeling, or repair work under applicable State or local laws. (2) If controlled demolition or pre-demolition activities will be performed, one copy of the asbestos survey report shall be submitted to the appropriate Asbestos Control Bureau district office. (3) One copy of the asbestos survey report must be kept on the construction site throughout the duration of the asbestos project and any associated demolition, renovation, remodeling, or repair project.

1.5 Lead-based Paint (LBP)

- This survey concluded that the readings summarized in Section 2.3 and Appendix E tested ***negative for lead-based paint***.

1.6 PolyChlorinated Biphenyls (PCB)

- This survey concluded that the materials listed in Section 2.4 tested ***positive for PCBs***.
- These materials must be removed and disposed of in accordance with ALL Federal, State and Local regulations.

2.0 Summary of Hazardous Materials

2.1 Summary of Identified ACM/PACM

KEY: **ACM** = Materials containing greater than 1% of asbestos; **HA** = Homogeneous Area; **LF** = Linear Feet; **SF** = Square Feet; **PACM** = Presumed Asbestos-containing Materials; **Friable** = ACM capable of being released into air, and which can be crumbled, pulverized, powdered, crushed or exposed by hand-pressure; ^A = Material is considered non-friable solely in an intact and undisturbed state, however, may be rendered friable if pulverized or crumbled while in dry state.

Samples collected by **Adelaide** July 24, 2023 & August 4, 2023

HA	Identified ACM	ACM Location(s)	Approx. Qty.	Condition	Friable? (Yes or No)
8	9x9 Floor Tile	A-Wing, Corridor & 6 Classrooms	7,000 SF	Good	No
		B-Wing, Corridor & 6 Classrooms	7,000 SF	Good	No
		C-Wing, Corridor & 6 Classrooms	7,000 SF	Good	No
		Library & Computer Lab	3,500 SF	Good	No
		Hallways (bottom layer)	NQ	Good	No

2.2 Summary of Identified Non-ACM

Samples collected by **Adelaide** July 24, 2023 & August 4, 2023

Identified Non-ACM	Sample Location(s) & HA's
2x2 Dot Textured Ceiling Tile	Throughout School
1x1 Splined Ceiling Tile	Throughout School
2x2 Dot Speck Ceiling Tile	Room E4
Sheetrock & Joint Compound	Throughout School
Brick Mortar	Throughout School
Cove Base & Adhesive	Throughout School
Mastic associated w/ ACM 9x9 Floor Tile	Throughout School
Ceramic Tile Grout & Mudset	Bathrooms Throughout
CMU Mortar	Walls Throughout School
Vestibule Caulk	Exterior, Main Entrance
Sidewalk Caulk (trace)	
Expansion Joint	
Concrete	
Peg Board	Room 0-3
1x1 Red Floor Tile & Mastic	Room 0-3
1x1 Beige Floor Tile & Mastic	Room B-10
Window Caulk	Exterior of Room 0-3
Plaster (<1%)	Exterior, Main Entrance, Overhang

2.3 Summary of Identified LBP

Based on review of the data generated by the Viken Pb200e X-Ray Fluorescence (XRF) Analyzer(s), the following surfaces tested were identified as lead-based, as defined by HUD/EPA (equal to or in excess of 1.0 milligram per square centimeter):

Readings collected by **Adelaide** July 24, 2023 & August 4, 2023

Location of LBP	LBP Component	Substrate	Color	Condition	Readings (mg/cm ²)
<i>NO Lead-based Paints identified above HUD/EPA standards of readings collected in reference to the above-mentioned scope of work.</i>					

2.4 Summary of Identified PCB-containing Materials

Samples collected by **Adelaide** July 24, 2023 & August 4, 2023

Sample #	Location / Description	Material Matrix	Color	Substrate	Analytical Result
P1	Exterior, Main Entrance, Vestibule Curtain Wall, along perimeter	Caulk	Grey	Metal & Concrete	320 ppm
P2	Exterior, Main Entrance, Sidewalk, along building	Caulk	Grey	Concrete	34,000 ppm

2.5 Observations

ASBESTOS-CONTAINING MATERIALS (ACM)

A visual inspection was performed, and homogeneous material types were established based on appearance, color and texture. The findings presented in this report are based upon reasonably available information and observed site conditions at the time the assessment was performed. The findings and conclusions of this report are not meant to be indicative of future conditions at the site and does not warrant against conditions that were not evident from visual observations or historical information obtained from others.

On July 24, 2023 & August 4, 2023, representative bulk sampling was performed on suspect building materials for laboratory analysis and the following is a summary of installed building materials sampled as per the scope of work provided:

- Ceiling Materials – Ceiling Tiles (multiple types), Sheetrock, Joint Compound, Overhang Plaster.
- Wall Materials – Sheetrock, Joint Compound, Cove Base & Adhesive, Brick Mortar, CMU Mortar, Peg Board.
- Flooring Materials – 9x9 Floor Tile & Mastic, 1x1 Floor Tile & Mastic (multiple types), Ceramic Tile System.
- Miscellaneous Materials – Misc. Caulks, Expansion Joint, Concrete.
- Non-suspect Materials (not sampled) – Fiberglass Insulation, Silicone, Wood, Glass, Metal.

3.0 Asbestos-containing Materials (ACM)

3.1 Field Procedures and Analysis Methodology

Guidelines used for the inspection were established by the U.S. Environmental Protection Agency (EPA) in the Guidance for Controlling Asbestos Containing Materials in Buildings, Office of Pesticides and Toxic Substances, DOC# 560/5-85-024 and 40 CFR Part 763, Asbestos Hazard Emergency Response Act (AHERA) and Title 12 NYCRR Part 56-5.1. Field information was organized as per the AHERA concept of a homogeneous area (HA); that is, suspect Asbestos-containing Materials (ACM) with similar age, appearance, and texture were grouped together, sampled and assessed for condition.

For the purposes of this inspection, suspect ACM has been placed in three material categories: thermal, surfacing, and miscellaneous. 1) Surfacing materials are those that are sprayed on, troweled on or otherwise applied to surfaces for fireproofing, acoustical, or decorative purposes (e.g., wall and ceiling plaster). 2) Thermal materials are those applied to heat pipes or other structural components to prevent heat loss or gain or prevent water condensation (e.g., pipe and fitting insulation, duct insulation, boiler flue). 3) Miscellaneous materials are interior building materials on structural components, structural members or fixtures, such as floor and ceiling tiles, etc. and do not include surfacing material or thermal system insulation.

SURFACING MATERIALS

Surfacing materials were grouped into homogeneous sampling areas. A homogeneous area contains material that is uniform in color and texture and appears identical in every other respect. Materials installed at different times belong to different sampling areas. Homogeneous areas were determined on per floor basis.

The following protocol was used for determining the number of samples to be collected:

- At least three bulk samples were collected from each homogeneous area that is 1,000 square feet or less.
- At least five bulk samples were collected from each homogeneous area that is greater than 1,000 square feet but less than or equal to 5,000 square feet.
- At least seven bulk samples were collected from each homogeneous area that is greater than 5,000 square feet.

THERMAL SYSTEM INSULATION (TSI)

The concept of homogeneous sampling areas applies equally well to thermal insulation as to surfacing material. A "typical" building may contain multiple insulated pipe runs from any combination of the following categories:

- Hot water supply and/or return
- Cold water supply
- Chilled water supply
- Steam supply and/or return
- Roof or system drain

The following protocol was used for determining the number of samples to be collected.

- Collect at least three bulk samples from each homogeneous area of thermal system insulation.
- Collect at least one bulk sample from each homogeneous area of patched thermal system insulation if the patched section is less than 6 linear or square feet.
- In a manner sufficient to determine whether the material is ACM or not ACM, collect a minimum of three bulk samples from each homogeneous insulated mechanical system tee, elbow, and valve.

Bulk samples are not collected from any homogeneous area where the certified inspector has determined that the thermal system insulation is fiberglass, foam glass, or rubber.

MISCELLANEOUS MATERIALS

Miscellaneous materials are grouped into different homogeneous areas and at least two bulk samples are collected from each homogeneous area as per the clarification letter from the EPA and the Professional Abatement Contractors of New York, Inc in November of 2007.

Samples collected were analyzed by a laboratory approved under the New York State Department of Health Environmental Laboratory Approval Program (NYSDOH ELAP). Samples were analyzed in the laboratory by Polarized Light Microscopy (PLM), Polarized Light Microscopy-NOB (PLM-NOB) and/or Quantitative Transmission Electron Microscopy (QTEM), as required. Sample collection and laboratory analysis were conducted in compliance with the requirements of Title 12 NYCRR Part 56-5.1, 29 CFR 1926.1101 and standard EPA & OSHA accepted methods. Samples consisting of multiple layers were separated and analyzed independently in the laboratory.

3.2 Regulatory Guidelines and Requirements for ACM

FEDERAL

In accordance with the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) established National Emission Standards for hazardous Air Pollutants (NESHAP) to protect the public from exposure to airborne pollutants. Asbestos was one of the air pollutants, which was addressed under the NESHAP 40 CFR Part 61. The purpose of asbestos NESHAP regulations is to protect the public health by minimizing the release of asbestos when facilities, which contain ACM, are being renovated or demolished. EPA is responsible for enforcing regulations related to asbestos during renovations and demolition, however, the CAA allows the EPA to delegate this authority to State and Local Agencies. Even after EPA delegate's responsibility to a state or Local agency, EPA retains the authority to oversee agency performance and to enforce NESHAP regulations as appropriate.

NEW YORK STATE

Asbestos in New York State is regulated under the Labor Law Section 906, Part 56 of Title 12 of the Official Compilation of Codes, Rules, and Regulations. Within the department and for the purpose of the Department of Labor, this part (rule) is known as Industrial Code Rule No. 56 (ICR 56) relating to hazards to the public safety and health, during the removal, encapsulation, or disturbance of friable asbestos, or any handling of ACM that may result in the release of asbestos fiber.

As specified in Title 12 NYCRR Part 56-5.1 (h) and (i), "If the building/structure asbestos survey finds that the portion of the building/structure to be demolished, renovated, remodeled, or have repair work contains ACM, PACM, suspect miscellaneous ACM assumed to be ACM, or asbestos material, which is impacted by the work, the owner or the owner's agent shall conduct, or cause to have conducted, asbestos removal performed by a licensed asbestos abatement contractor in conformance with all standards set forth in this Part. All ACM, PACM, suspect miscellaneous ACM assumed to be ACM, or asbestos material impacted by the demolition, renovation, remodeling or repair project shall be removed as per this Part, prior to access or disturbance by other uncertified trades or personnel. No demolition, renovation, remodeling or repair work shall be commenced by any owner or the owner's agent prior to the completion of the asbestos abatement in accordance with the notification requirements of this Part...All building/structure owners and asbestos abatement contractors on a demolition, renovation, remodeling, or repair project, which includes work covered by this part, shall inform all trades on the work site about PACM, ACM, asbestos material and suspect miscellaneous ACM...Bids may be advertised and contracts awarded for demolition, remodeling, renovation, or repair work, but no work on the current intermediate portion of the project shall commence on the demolition, renovation, remodeling or repair work by any owner or agent prior to completion of all necessary asbestos abatement work for the current intermediate portion of the entire project, in conformance with all standards set forth in this Part." All work conducted should be in accordance with all legal requirements, including but not limited to U.S. Environmental Protection Agency (EPA) National Emissions Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Part 61], New York State Industrial Code Rule 56 Asbestos Regulations (ICR 56) and Chapter 1 of Title 15 of the Rules of the City of New York Regulations, as applicable. Advance notification of the asbestos project to the USEPA, NYSDOL, and NYCDEP may be required.

CONCEALED ACM

In addition to the ACMs identified at the site, there is a possibility that concealed suspect ACM may exist at the building/structure. As such, if any concealed suspect ACM is encountered during future construction related activities, the work should immediately stop. Prior to resuming the work, the suspect ACM should either be 1) Sampled by an appropriately-certified asbestos professional and submitted to an Approved NYSDOH ELAP laboratory for asbestos analysis or 2) Presumed to be ACM (PACM) and removed by a licensed asbestos abatement contractor for disposal in accordance with all applicable regulations.

4.0 Lead-based Paint (LBP)

4.1 Applicable Standards/Guidelines for LBP

The U.S Department of Housing and Urban Development (HUD) defines the action level for lead-based paint as a lead content equal to or greater than 1.0 milligrams of lead per square centimeter of painted surface ($\geq 1.0 \text{ mg Pb/cm}^2$) when measured with an XRF analyzer or 0.5 percent by weight when chemically tested. This definition is described in the HUD "Lead-Based Paint: Interim Guidelines for Hazard Identification and Abatement in Public and Indian Housing, September 1990". The state of New York's definition of the action level for lead-based paint is consistent with the level established by HUD.

Please note that although the HUD defines lead-based paint as paint having lead concentrations equal or greater than 1.0 mg/cm², the Occupational Safety and Health Administration (OSHA) considers any concentration of lead in paint to be lead-containing paint. Regardless of the lead concentrations in paint, the contractor shall comply with 29 CFR 1926.62, OSHA regulations, and take precautionary measures for dust control and limit employee exposure to lead dust during the renovations.

Painted surfaces that would be impacted by planned activities such as drilling, cutting, scrapping, etc. and create dust should be properly addressed by following safe work practices, good housekeeping procedures and/or following proper abatement procedures. Grinding and sanding of paint without HEPA filter exhaust, open flame gas fired torch, unconfined abrasive blasting, and chemical strippers containing methylene chloride or other human carcinogenic chemicals are not recommended.

The Federal Resource Conservation and Recovery Act (RCRA) regulation governs the handling, transportation, and disposal of hazardous materials. Every demolition/renovation debris generator has the responsibility to determine whether the debris exhibits one or more of the characteristic wastes listed in subpart C of 40 CFR Part 261. In the case of demolition debris, lead in LBP is a characteristic waste, and therefore, it is the responsibility of the renovation/demolition debris generator to characterize the waste prior to its disposal and, if found to be hazardous waste as defined by Federal Statutes, to be properly handled and disposed.

Metal objects painted with LBP are exempt from disposal regulations applicable to lead, provided they are properly recycled. All metal objects that are painted with LBP should be sent to a certified recycling facility.

This report is not Lead-based Paint abatement specification and should not be used for specifying removal methods or techniques.

4.2 XRF Information

Viken Pb200e X-Ray Fluorescence (XRF) Analyzer(s) were used to survey the building/structure or portion thereof identified to be demolished, renovated, remodeled or repaired for the presence of LBP. The Viken Pb200e XRF Analyzer(s) are using a sealed source of Co-57 with 6mCi sources, meeting HUD requirements for the analysis of paint films. During the analysis, the intensity of the x-rays is converted by the instrument's internal software into an estimate of the concentration of lead in the substance being analyzed. The results are interpreted as concentrations of lead in milligrams per square centimeter. This device is a field-screening tool, used to collect multiple readings in a short period of time. The method of measurement is based on spectrometric analysis of lead x-ray fluorescence within a controlled depth of interrogation. The reading is an estimate of lead content in all layers of paint. The results are displayed in milligrams per square centimeter (mg/cm²). The device(s) used for this inspection were the Viken Pb200e X-Ray Fluorescence (XRF) Analyzer(s) Serial Number 2104, Source date 4/1/23, Serial number 2231, Source date 5/15/22, Serial number 2595, Source date 2/15/23 and/or Serial number 2901, Source date 2/15/23.

5.0 PolyChlorinated Biphenyls (PCB)

5.1 Background and Protocol for PCBs

PolyChlorinated Biphenyls (PCB) are a group of manmade chemicals. PCBs were widely used in building materials and electrical products in the past. The U.S. Environmental Protection Agency banned the manufacturing and certain uses of PCBs in 1978, but buildings constructed or renovated between 1950 and 1978 may still have building materials and electrical products that contain PCBs. Examples of products that may contain PCBs include caulk, paint, glues, plastics, fluorescent lighting ballasts, transformers and capacitors.

PCBs are currently prohibited from being used in caulk and other commodities (U.S. EPA, 40 CFR 761). However, prior to 1977, PCBs were present in some caulking materials used in the construction of schools and other buildings. Studies have shown that concentrations of PCB can exceed 1% (10,000 ppm) by weight in some caulk materials. An investigation of 24 buildings in the Greater Boston Area revealed that one-third of the buildings tested (8 of 24) contained caulking materials with polychlorinated biphenyl (PCB) content exceeding 50 ppm by weight with an average concentration of 15,600 ppm or 1.5% (Herrick et al., 2004). These buildings included schools and other public buildings.

The U.S. EPA regulates the disposal of caulk, as well as soil and other materials contaminated with PCBs from caulk, if the concentration of PCBs exceeds 50 ppm. Such materials must be disposed at an appropriate approved or permitted facility.

U.S. EPA regulation 40 CFR 761 defines "PCB remediation waste" to include contaminated soil, and specifies a clean-up level of <1ppm without further conditions for unrestricted use in "high occupancy areas" (i.e., areas where individuals may be present for 335 hours or more per year). PCB caulk is defined as a PCB bulk product waste, and its disposal is subject to U.S. EPA regulations under the Toxic Substances Control Act (40 CFR761.62).

This protocol has been developed in consultation with the New York State Department of Health, Division of Environmental Health Assessment, Bureau of Toxic Substance Assessment to address concerns about properly managing caulk containing PCBs that will be disturbed during building renovation and maintenance.

CAULK SAMPLE COLLECTION

Buildings constructed or renovated between 1950 and 1977 have a potential to contain PCBs in existing caulk. Representative samples of caulking materials from these buildings prior to renovation or demolition work should be tested to determine whether the caulk is contaminated with PCBs. Professional judgement should be used to design the sampling plan for characterizing caulk throughout the building. The consultant should pay particular attention to construction and maintenance records and to the appearance of caulking materials (likenesses and differences). Samples should be taken from window frames or expansion joints that have not been repaired or replaced since 1977. Depending on specific information provided in the workplan developed by the project manager, such as window placement, compositing of some caulk samples might be appropriate. Caulk from different time periods or that have a different appearance should not be composited together.

It is important to note that caulk used during the time period of interest may also contain asbestos or lead. Therefore, the work plan should include testing, handling and disposal requirements appropriate for such regulated materials.

SOIL SAMPLE COLLECTION

Buildings constructed or renovated between 1950 and 1977, which have undergone further renovation after 1977, may have residual PCB contamination in adjacent soils. An adequate representation of surface soils should be tested to assess the potential for residual PCB contamination.

When designing a representative soil sampling plan, the likelihood of soil contamination from deteriorated or deteriorating caulk should be considered. Caulk that has in the past dried out and fallen to the ground is the most important source of soil contamination. Thus, sampling should include soil beneath windows where caulk has obviously deteriorated or been replaced because of previous deterioration. Areas subject to the stress of sun and prevailing weather (typically the southern and western side of each structure) should be included for sampling. These samples would provide a conservative evaluation of soil conditions due to an increased potential for material failure, possibly resulting in contamination of soil. Also, if earlier renovation or demolition work may have stockpiled potentially contaminated caulk in other school areas, the school should consider having soils in those areas tested as well.

Soil sampling should focus on areas of the building where "banks" or "gangs" of windows exist/were replaced and areas of the structure where large expansion joints are located. This would provide a conservative evaluation of potential soil contamination and permit efficient sampling.

Any obvious pieces of caulk encountered during the collection of soil samples should be removed from the soil, categorized (with respect to location and depth) and treated as a separate potential sample.

Depth – At each soil sample location, soil should be collected in depth intervals of 0-2 inches, 2-6 inches and 6-12 inches. The surface soil sample (0-2 inches) should be collected from below the vegetative surface layer, if present.

Distance from Structure – Samples should be collected within 1 foot of the building and 5 feet from the building.

Samples should be collected in a manner that prevents cross-contamination. Augers or driven core samplers should be avoided, as any caulk caught on the edge of this type of tool could be driven to lower intervals. Using a designated trowel for each sample location and each interval of depth is encouraged. If the sampling tool is field cleaned between samples, do so in a manner that does not add solvent contamination to the environment.

NOTE

Sampling was performed by **Adelaide** in compliance with protocols outlined by New York State Education Department (NYSED) and USEPA 40 CFR 761, as described above. Only one sample per homogeneous area was required for analysis of suspect PCB-containing materials. Bulk sample(s) were properly packaged and forwarded, with associated Chain of Custody (COC), to York Analytical Laboratories, Inc., for analysis using method SW846-3550B/8082. The analysis will determine if the suspect material will be classified as PCB-containing at or above 50 ppm or mg/kg as per the EPA regulations. Copies of the analytical results are contained within attached appendices for review.

6.0 General Discussion

All construction personnel as well as individuals who have access to locations where asbestos-containing materials (ACM), lead-based paints (LBP) and/or polychlorinated biphenyls (PCB) exists should be informed of its presence and the proper work practices in these areas. Conspicuous labeling of all ACM is suggested to ensure personnel is adequately informed. Personnel should be informed not to rest, lean or store material or equipment on or near these surfaces and not to cut, saw, drill, sand or disturb ACM. All removal, disturbance, and repair of ACM should be performed in compliance with Title 12 NYCRR Part 56 by persons properly trained to handle ACM. Facility custodial and maintenance personnel should receive training commensurate with their work activities; as defined in 29 CFR 1910.1001.

7.0 Disclaimers

Adelaide certifies that the information contained within this report is based solely upon site observations and the results of laboratory analysis for samples collected during this survey/assessment. These observations and results are time dependent, subject to changing site conditions and revisions to Federal, State and Local regulations. **Adelaide** warrants that these findings have been promulgated after being prepared in general accordance with generally accepted practices in the abatement industries. **Adelaide** also recognizes that inspection laboratory data is not usually sufficient to make all abatement and management decisions. No other warranties are expressed or implied.

The materials sampled, as part of this survey, were limited to building materials potential affected by the provided scope of work only. All building materials outside the scope of work that have the potential to be disturbed, impacted, or if the scope of work is to change, are to be presumed asbestos-containing materials (PACM). Identified PACM **must** either be sampled by a licensed NYS Asbestos Inspector and/or abated/removed and disposed of by a licensed NYS Asbestos Abatement Contractor.

Due to the potential for concealed Asbestos-containing Materials (ACM) and/or other regulated materials, this report should not be construed to represent all ACM and/or regulated materials within the site(s). All quantities of ACM and/or other regulated materials identified, and all dimensions listed within this report are approximate and should be verified On-site.

This report is generated for the exclusive use of the client and is not designed to serve as a specification for abatement. The owner is strongly encouraged to contract with a consultant having a current Asbestos Project Designer Certificate as issued by New York State Department of Labor for the preparation of contract specifications, work plans, and/or drawings prior to requesting bids for the abatement or removal of the materials identified in this report.

NYSDOH issued an Interim Guidance Letter, on July 9, 2013, which outlined the approved testing alternative for materials containing vermiculite. Specifically, "...Where TSI, surfacing materials, or other PACM or miscellaneous suspect ACM contain greater than 10% vermiculite, Item 198.6 may be used to evaluate the asbestos content of the material; provided, however, that any test results using this method must be reported with the following conspicuous disclaimer: *"This method does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite."* On July 22, 2014, NYSDOH issued a Regulatory Guidance Letter outlining the new approved analytical methods for testing sprayed-on fireproofing (SOFV) that contains vermiculite. NYSDOH authorized the use of **two** analytical methods to evaluate the asbestos content of SOFV that contains vermiculite. As per NYSDOH Guidelines, *"After October 31, 2014, one of the new methods **must** be used to test SOF-V, regardless of the percent of vermiculite."* On May 6, 2016, NYSDOH issued a Regulatory Guidance Letter outlining the new protocol for analytical procedure for surfacing materials (ie. plaster, stucco, etc.) that contain vermiculite. As per NYSDOH Guidelines, *"The original July 2013 and July 2014 letters addressed SOF-V only. Both NYS DOH's Item 198.8 and Rj Lee Group Method 055 shall now be applied to test for vermiculite in other Surfacing Material (SM) as defined in 12 NYCRR Part 56 (NYS Industrial Code Rule 56)."*

APPENDIX A
ACM LOCATION MAP(S)



ACM LEGEND: (see report for details)	
1A	ACM 9x9 White Floor Tile & Mastic (exposed)
1B	ACM 9x9 White Floor Tile & Mastic (bottom layer)

Adelaide
 ENVIRONMENTAL HEALTH
 1511 Route 22
 Brewster, NY 10509
 Phone: (845) 278-7710
 Fax: (845) 278-7750

CLIENT:
KG+D Architects, PC
 285 Main Street
 Mount Kisco, New York 10549

SED Project #
66-01-01-03-0-007-016

SURVEY LOCATION:
Meadow Pond ES
 185 Smith Ridge Road
 South Salem, New York 10590

DATE: 08/16/2023

DRAWING VERSION: No. 1

ISSUED FOR:
 Limited HazMat Survey

ADELAIDE PROJECT NO.:
 KGD-RM:23164.05-IN

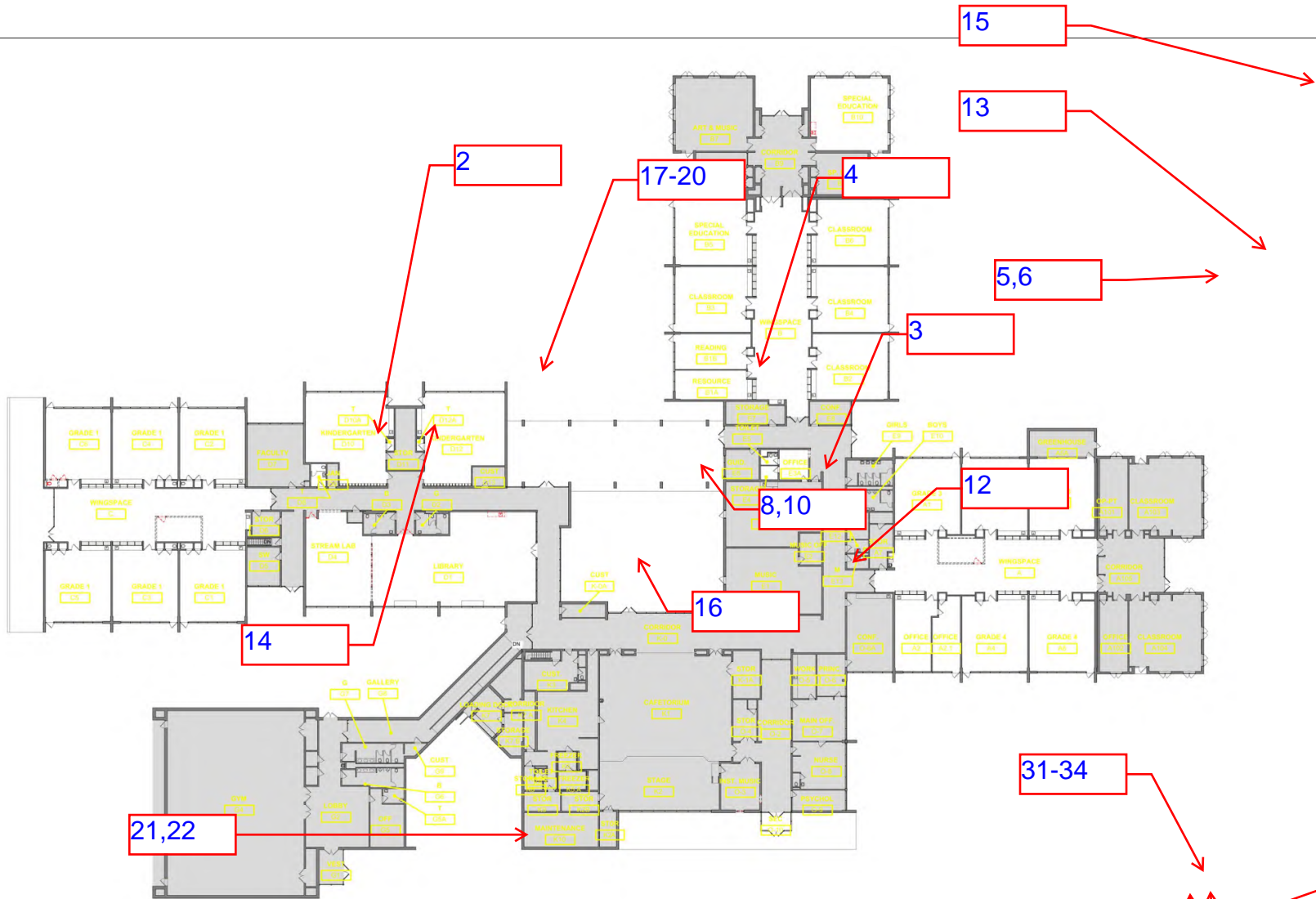
DRAWING PREPARED BY:
 PJP

ASB-01

First Floor Key Plan - Limited ACM Locations

ACM locations identified on this drawing are ONLY limited to the scope of work provided
 Drawing Not to Scale

APPENDIX B
SAMPLE LOCATION MAP(S)



First Floor Key Plan - Sample Locations
 Drawing Not to Scale

Adelaide
 ENVIRONMENTAL HEALTH
 1511 Route 22
 Brewster, NY 10509
 Phone: (845) 278-7710
 Fax: (845) 278-7750

CLIENT:
KG+D Architects, PC
 285 Main Street
 Mount Kisco, New York 10549

SED Project #
66-01-01-03-0-007-016

SURVEY LOCATION:
Meadow Pond ES
 185 Smith Ridge Road
 South Salem, New York 10590

DATE: 08/16/2023

DRAWING VERSION: No. 1

ISSUED FOR
 Limited HazMat SU

ADELAIDE PROJECT NO.:
 KGDRM-23164-05-JN

BY:

SL-01

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21,22

APPENDIX C
ACM PHOTO(S)

HA 8
Wings
9x9 Floor Tile
6.6% Chrysotile



HA 8
Library
Under Carpet
9x9 Floor Tile
6.6% Chrysotile



HA 8
Computer Lab
Bottom layer under
1x1 Floor Tile
9x9 Floor Tile
6.6% Chrysotile



APPENDIX D
ASBESTOS ANALYTICAL RESULTS

Client Name: Adelaide Environmental Health

Table I
Summary of Bulk Asbestos Analysis Results

KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge Road, South Salem, NY 10590

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	1	1	0.127	21.6	39.2	39.2	NAD	NAD
	Location: A Wing, Drop Ceiling, 2 X 2 Dot Textured - Ceiling Tile							
02	2	1	0.180	26.8	42.2	31.0	NAD	NAD
	Location: C Wing, Drop Ceiling, 2 X 2 Dot Textured - Ceiling Tile							
03	3	2	0.275	11.2	70.2	18.6	NAD	NAD
	Location: Library, Drop Ceiling, 1 X 1 Splined - Ceiling Tile							
04	4	2	0.238	11.5	68.8	19.6	NAD	NAD
	Location: Room D12, Drop Ceiling, 1 X 1 Splined - Ceiling Tile							
05	5	3	0.209	27.1	42.3	30.5	NAD	NAD
	Location: Room E4, Drop Ceiling, 2 X 2 Dot Speck - Ceiling Tile							
06	6	3	0.210	25.8	36.9	37.3	NAD	NAD
	Location: Room E4, Drop Ceiling, 2 X 2 Dot Speck - Ceiling Tile							
07	7	4	----	----	----	----	NAD	NA
	Location: A Wing - Sheetrock							
08	8	4	----	----	----	----	NAD	NA
	Location: Library - Sheetrock							
09	9	5	----	----	----	----	NAD	NA
	Location: A Wing - Joint Compound							
10	10	5	----	----	----	----	NAD	NA
	Location: Library - Joint Compound							
11	11	6	----	----	----	----	NAD	NA
	Location: A Wing - Brick Wall - Mortar							
12	12	6	----	----	----	----	NAD	NA
	Location: Library - Brick Wall - Mortar							
13L1	13	7	0.351	33.6	57.8	8.6	NAD	NAD
	Location: B Wing, Cove Base							
13L2	13	7	0.213	69.5	7.2	23.3	NAD	NAD
	Location: B Wing, Cove Base - Adhesive							
14L1	14	7	0.333	34.7	55.7	9.6	NAD	NAD
	Location: C Wing, Cove Base							
14L2	14	7	0.242	62.7	10.6	26.7	NAD	NAD
	Location: C Wing, Cove Base - Adhesive							

Client Name: Adelaide Environmental Health

Table I
Summary of Bulk Asbestos Analysis Results

KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge Road, South Salem, NY 10590

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
15L1	15	8	0.297	22.3	21.2	49.9	Chrysotile 6.6	NA
	Location: B Wing, Floor, 9 X 9 - Floor Tile							
15L2	15	8	0.086	73.0	12.6	14.4	NAD	NAD
	Location: B Wing, Floor, 9 X 9 - Floor Tile Mastic							
16L1	16	8	0.264	25.4	18.7	55.9	NA/PS	NA
	Location: Library, Floor, Under Carpet - 9 x 9 Floor Tile							
16L2	16	8	0.111	73.1	8.0	18.9	NAD	NAD
	Location: Library, Floor, Under Carpet - 9 x 9 Floor Tile Mastic							
17	17	9	----	----	----	----	NAD	NA
	Location: D Wing Adduct Bathroom, Ceramic tile Floor - Grout							
18	18	9	----	----	----	----	NAD	NA
	Location: D Wing Adduct Bathroom, Ceramic tile Floor - Grout							
19	19	10	----	----	----	----	NAD	NA
	Location: D Wing Adduct Bathroom, Ceramic tile Floor - Mudset							
20	20	10	----	----	----	----	NAD	NA
	Location: D Wing Adduct Bathroom, Ceramic tile Floor - Mudset							
21	21	11	----	----	----	----	NAD	NA
	Location: Gym, CMU Wall - Mortar							
22	22	11	----	----	----	----	NAD	NA
	Location: Gym, CMU Wall - Mortar							
23	23	12	0.204	28.9	57.5	13.6	NAD	NAD
	Location: Exterior, Main Entrance, Vestibule, Caulk							
24	24	12	0.293	34.5	58.4	7.2	NAD	NAD
	Location: Exterior, Main Entrance, Vestibule, Caulk							
25	25	13	0.184	51.1	32.0	16.8	NAD	Chrysotile Trace
	Location: Exterior, Main Entrance, Sidewalk - Caulk							
26	26	13	0.137	52.4	29.6	18.0	NAD	Chrysotile Trace
	Location: Exterior, Main Entrance, Sidewalk - Caulk							
27	27	14	----	----	----	----	NAD	NA
	Location: Exterior, Main Entrance, Sidewalk - Expansion Joint							
28	28	14	----	----	----	----	NAD	NA
	Location: Exterior, Main Entrance, Sidewalk - Expansion Joint							

Client Name: Adelaide Environmental Health

Table I
Summary of Bulk Asbestos Analysis Results

KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge Road, South Salem, NY 10590

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
29	29	15	----	----	----	----	NAD	NA
Location: Exterior, Main Entrance, Sidewalk - Concrete								
30	30	15	----	----	----	----	NAD	NA
Location: Exterior, Main Entrance, Sidewalk - Concrete								

Analyzed by: Feyza Gungor
Date: 7/26/2023



Reviewed by: Feyza Gungor



**Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by Appd E to Subpt E, 40 CFR 763 or NYSDOH ELAP 198.1 for New York friable samples or NYSDOH ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (or NYSDOH ELAP 198.4; for New York samples). Analysis using Hitachi, Model H7000-Noran 7 System, Microscope, Serial #: 747-05-06. NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, NJ Lab ID #NY031.

Warning Note: PLM limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogenous materials).



AmeriSci New York

117 EAST 30TH ST.
NEW YORK, NY 10016
TEL: (212) 679-8600 • FAX: (212) 679-3114

PLM Bulk Asbestos Report

Adelaide Environmental Health
Attn: John Soter
1511 Rte. 22 Suite C24

Brewster, NY 10509

Date Received 07/25/23 **AmeriSci Job #** 223073766
Date Examined 07/26/23 **P.O. #**
ELAP # 11480 **Page** 1 of 7
RE: KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge
Road, South Salem, NY 10590

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1 1	223073766-01 Location: A Wing, Drop Ceiling, 2 X 2 Dot Textured - Ceiling Tile	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 39.2%			
2 1	223073766-02 Location: C Wing, Drop Ceiling, 2 X 2 Dot Textured - Ceiling Tile	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 31%			
3 2	223073766-03 Location: Library, Drop Ceiling, 1 X 1 Splined - Ceiling Tile	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 18.6%			
4 2	223073766-04 Location: Room D12, Drop Ceiling, 1 X 1 Splined - Ceiling Tile	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 19.6%			
5 3	223073766-05 Location: Room E4, Drop Ceiling, 2 X 2 Dot Speck - Ceiling Tile	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 30.5%			

Client Name: Adelaide Environmental Health

PLM Bulk Asbestos ReportKGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge
Road, South Salem, NY 10590

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
6 3	223073766-06 Location: Room E4, Drop Ceiling, 2 X 2 Dot Speck - Ceiling Tile	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 37.3%			
7 4	223073766-07 Location: A Wing - Sheetrock	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: White/Brown, Heterogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 15%, Non-fibrous 85%			
8 4	223073766-08 Location: Library - Sheetrock	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose Trace, Non-fibrous 100%			
9 5	223073766-09 Location: A Wing - Joint Compound	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
10 5	223073766-10 Location: Library - Joint Compound	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
11 6	223073766-11 Location: A Wing - Brick Wall - Mortar	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

Client Name: Adelaide Environmental Health

PLM Bulk Asbestos Report

KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge
Road, South Salem, NY 10590

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
12 6	223073766-12 Location: Library - Brick Wall - Mortar	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100%			
13 7	223073766-13L1 Location: B Wing, Cove Base	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 8.6%			
13 7	223073766-13L2 Location: B Wing, Cove Base - Adhesive	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 23.3%			
14 7	223073766-14L1 Location: C Wing, Cove Base	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 9.6%			
14 7	223073766-14L2 Location: C Wing, Cove Base - Adhesive	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 26.7%			
15 8	223073766-15L1 Location: B Wing, Floor, 9 X 9 - Floor Tile	Yes	6.6% (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types: Chrysotile 6.6 %			
Other Material: Non-fibrous 49.9%			

Client Name: Adelaide Environmental Health

PLM Bulk Asbestos ReportKGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge
Road, South Salem, NY 10590

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
15 8	223073766-15L2 Location: B Wing, Floor, 9 X 9 - Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 14.4%			
16 8	223073766-16L1 Location: Library, Floor, Under Carpet - 9 x 9 Floor Tile		NA/PS
Analyst Description: Bulk Material Asbestos Types: Other Material:			
16 8	223073766-16L2 Location: Library, Floor, Under Carpet - 9 x 9 Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 18.9%			
17 9	223073766-17 Location: D Wing Adduct Bathroom, Ceramic tile Floor - Grout	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
18 9	223073766-18 Location: D Wing Adduct Bathroom, Ceramic tile Floor - Grout	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
19 10	223073766-19 Location: D Wing Adduct Bathroom, Ceramic tile Floor - Mudset	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

Client Name: Adelaide Environmental Health

PLM Bulk Asbestos ReportKGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge
Road, South Salem, NY 10590

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
20 10	223073766-20 Location: D Wing Adduct Bathroom, Ceramic tile Floor - Mudset	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
21 11	223073766-21 Location: Gym, CMU Wall - Mortar	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
22 11	223073766-22 Location: Gym, CMU Wall - Mortar	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
23 12	223073766-23 Location: Exterior, Main Entrance, Vestibule, Caulk	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 13.6%			
24 12	223073766-24 Location: Exterior, Main Entrance, Vestibule, Caulk	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 7.2%			
25 13	223073766-25 Location: Exterior, Main Entrance, Sidewalk - Caulk	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 16.9%			

PLM Bulk Asbestos Report

KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge Road, South Salem, NY 10590

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
26 13	223073766-26 Location: Exterior, Main Entrance, Sidewalk - Caulk	No	NAD (by NYS ELAP 198.6) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 18.1%			
27 14	223073766-27 Location: Exterior, Main Entrance, Sidewalk - Expansion Joint	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 80%, Non-fibrous 20%			
28 14	223073766-28 Location: Exterior, Main Entrance, Sidewalk - Expansion Joint	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 80%, Non-fibrous 20%			
29 15	223073766-29 Location: Exterior, Main Entrance, Sidewalk - Concrete	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
30 15	223073766-30 Location: Exterior, Main Entrance, Sidewalk - Concrete	No	NAD (by NYS ELAP 198.1) by Kensen Caro on 07/26/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

Client Name: Adelaide Environmental Health

PLM Bulk Asbestos Report

KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge
Road, South Salem, NY 10590

Reporting Notes:

Analyzed by: Kensen Caro
Date: 7/26/2023



Reviewed by: Feyza Gungor



*NAD/NSD =no asbestos detected; NA =not analyzed; NA/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Motic, Model BA310 Pol Scope, Microscope, Serial #: 1190000538, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

_____END OF REPORT_____

Adelaide Environmental Health Associates, Inc

1511 Route 22, Suite C24
Brewster, NY 10509
845-278-7710
845-278-7750 - fax

Site Address: Meadow Pond ES			Date: 07/24/23	Inspector(s) Philip J. Page		
185 Smith Ridge Road						
South Salem, NY 10590			Project #: KGD-RM:23164.05-IN			
Sample ID #	Homogeneous Area	Floor Level	Sample Location/Description	Quantity (In Feet)	Friable NonFriable	Condition g, d, sd
1	1		A WING, DROP CEILING, 2x2 DOT TEXTURED - CEILING TILE			
2	↓		C WING, ↓			
3	2		LIBRARY, 1x1 SPLINED -			
4	↓		ROOM D12, ↓			
5	3		ROOM E4, 2x2 DOT SPECK -			
6	↓		↓ ↓ ↓ ↓			
7	4		A WING, - SHEETROCK			
8	↓		LIBRARY - ↓			
9	5		A WING - JOINT COMPOUND			
10	↓		LIBRARY - ↓			
11	6		A WING, BRICK WALL - MORTAR			
12	↓		LIBRARY, - ↓ ↓			
Special Instructions/ Turnaround Time:				Relinquished by:		
228073766 Stop at 1st Positive per Homogenous Area 24 HR TAT				Received by: <i>[Signature]</i> Relinquished by: <i>S. Neretich for Rent 7/25/23 11:08</i>		
E-Mail Results to AdelaideLabResults@adelaidellc.com & ppage@adelaidellc.com				Received by:		


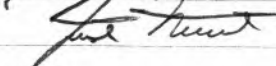
Adelaide Environmental Health Associates, Inc

1511 Route 22, Suite C24

Brewster, NY 10509

845-278-7710

845-278-7750 - fax

Site Address: Meadow Pond ES			Date: 07/24/23	Inspector(s) Philip J. Page		
185 Smith Ridge Road						
South Salem, NY 10590			Project #: KGD-RM:23164.05-IN			
Sample ID #	Homogeneous Area	Floor Level	Sample Location/Description	Quantity (In Feet)	Friable NonFriable	Condition g, d, sd
13	7		B WING, COVE BASE - ADHESIVE			
14	↓		C WING, ↓ ↓			
15	8		B WING, FLOOR, 9x9 - FLOOR TILE + MASTIC			
16	↓		LIBRARY, ↓, UNDER CARPET - ↓			
17	9		D WING ADULT BATHROOM, CERAMIC TILE FLOOR - GROUT			
18	↓		↓ ↓ ↓			
19	10		- MUDSET			
20	↓		↓ ↓ ↓			
21	11		GYM, CMU WALL - MORTAR			
22	↓		↓ ↓ ↓			
23	12		EXTERIOR, MAIN ENTRANCE, VESTIBULE - CAULK			
24	↓		↓ ↓ ↓ ↓			
Special Instructions/ Turnaround Time: 223073766				Relinquished by: 		
Stop at 1st Positive per Homogenous Area				Received by: S. Veretich  7/25/23 11:08		
E-Mail Results to AdelaideLabResults@adelaidellc.com & ppage@adelaidellc.com				Relinquished by:		
				Received by:		
24 HR TAT						

Client Name: Adelaide Environmental Health

Table I
Summary of Bulk Asbestos Analysis Results

KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge Road, South Salem, NY 10590

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	31	16	----	----	----	----	NAD	NA
	Location: Room O-3, Wall - Peg Board							
02	32	16	----	----	----	----	NAD	NA
	Location: Room O-3, Wall - Peg Board							
03L1	33	17	0.255	11.1	86.2	2.7	NAD	NAD
	Location: Room O-3, Floor, 1 x 1 Red - Floor Tile & Mastic / Tile							
03L2	33	17	0.142	53.0	43.1	4.0	NAD	NAD
	Location: Room O-3, Floor, 1 x 1 Red - Floor Tile & Mastic / Mastic							
04L1	34	17	0.295	12.0	85.7	2.4	NAD	NAD
	Location: Room O-3, Floor, 1 x 1 Red - Floor Tile & Mastic / Tile							
04L2	34	17	0.165	63.2	33.3	3.6	NAD	NAD
	Location: Room O-3, Floor, 1 x 1 Red - Floor Tile & Mastic / Mastic							
05L1	35	18	0.277	15.4	74.8	9.8	NAD	NAD
	Location: Room B-10, Floor, 1 x 1 Beige - Floor Tile & Mastic / Tile							
05L2	35	18	0.159	68.1	29.0	2.9	NAD	NAD
	Location: Room B-10, Floor, 1 x 1 Beige - Floor Tile & Mastic / Mastic							
06L1	36	18	0.232	14.3	82.6	3.1	NAD	NAD
	Location: Room B-10, Floor, 1 x 1 Beige - Floor Tile & Mastic / Tile							
06L2	36	18	0.170	70.9	25.0	4.1	NAD	NAD
	Location: Room B-10, Floor, 1 x 1 Beige - Floor Tile & Mastic / Mastic							
07	37	19	0.185	71.7	21.2	7.1	NAD	NAD
	Location: Exterior, Room O-3, Window - Caulk							
08	38	19	0.202	71.3	21.2	7.5	NAD	NAD
	Location: Exterior, Room O-3, Window - Caulk							
09	39	20	----	----	----	----	Chrysotile 0.8	NA
	Location: Exterior, Main Entrance Overhang - Plaster							
10	40	20	----	----	----	----	Chrysotile 0.3	NA
	Location: Exterior, Main Entrance Overhang - Plaster							
11	41	20	----	----	----	----	Chrysotile 0.5	NA
	Location: Exterior, Main Entrance Overhang - Plaster							

Client Name: Adelaide Environmental Health

**Table I
Summary of Bulk Asbestos Analysis Results**

KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge Road, South Salem, NY 10590

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
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Analyzed by: Khaalid W. Perine
Date: 8/8/2023



Reviewed by: Karol H. Lu



**Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by Appd E to Subpt E, 40 CFR 763 or NYSDOH ELAP 198.1 for New York friable samples or NYSDOH ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (or NYSDOH ELAP 198.4; for New York samples). Analysis using Hitachi, Model H7000-Noran 7 System, Microscope, Serial #: 747-05-06. NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, NJ Lab ID #NY031.

Warning Note: PLM limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogenous materials).



AmeriSci New York

117 EAST 30TH ST.
NEW YORK, NY 10016
TEL: (212) 679-8600 • FAX: (212) 679-3114

PLM Bulk Asbestos Report

Adelaide Environmental Health
Attn: John Soter
1511 Rte. 22 Suite C24

Brewster, NY 10509

Date Received 08/07/23 **AmeriSci Job #** 223081719
Date Examined 08/07/23 **P.O. #**
ELAP # 11480 **Page** 1 of 3
RE: KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge
Road, South Salem, NY 10590

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
31 16	223081719-01 Location: Room O-3, Wall - Peg Board	No	NAD (by NYS ELAP 198.1) by Valeriu Voicu on 08/07/23
Analyst Description: White/Brown, Heterogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 90%, Non-fibrous 10%			
32 16	223081719-02 Location: Room O-3, Wall - Peg Board	No	NAD (by NYS ELAP 198.1) by Valeriu Voicu on 08/07/23
Analyst Description: White/Brown, Heterogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 85%, Non-fibrous 15%			
33 17	223081719-03L1 Location: Room O-3, Floor, 1 x 1 Red - Floor Tile & Mastic / Tile	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 08/07/23
Analyst Description: Red, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 2.7%			
33 17	223081719-03L2 Location: Room O-3, Floor, 1 x 1 Red - Floor Tile & Mastic / Mastic	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 08/07/23
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 4%			
34 17	223081719-04L1 Location: Room O-3, Floor, 1 x 1 Red - Floor Tile & Mastic / Tile	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 08/07/23
Analyst Description: Red, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 2.4%			

Client Name: Adelaide Environmental Health

PLM Bulk Asbestos Report

KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge
Road, South Salem, NY 10590

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
34 17	223081719-04L2 Location: Room O-3, Floor, 1 x 1 Red - Floor Tile & Mastic / Mastic	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 08/07/23
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 3.6%			
35 18	223081719-05L1 Location: Room B-10, Floor, 1 x 1 Beige - Floor Tile & Mastic / Tile	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 08/07/23
Analyst Description: Beige, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 9.8%			
35 18	223081719-05L2 Location: Room B-10, Floor, 1 x 1 Beige - Floor Tile & Mastic / Mastic	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 08/07/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 2.9%			
36 18	223081719-06L1 Location: Room B-10, Floor, 1 x 1 Beige - Floor Tile & Mastic / Tile	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 08/07/23
Analyst Description: Beige, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 3.1%			
36 18	223081719-06L2 Location: Room B-10, Floor, 1 x 1 Beige - Floor Tile & Mastic / Mastic	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 08/07/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 4.1%			
37 19	223081719-07 Location: Exterior, Room O-3, Window - Caulk	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 08/07/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 7.1%			

Client Name: Adelaide Environmental Health

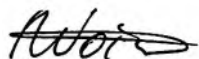
PLM Bulk Asbestos Report

KGD-RM:23164.05-IN; Meadow Pond ES; 185 Smith Ridge Road, South Salem, NY 10590

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
38 19 Location: Exterior, Room O-3, Window - Caulk	223081719-08	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 08/07/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 7.5%			
39 20 Location: Exterior, Main Entrance Overhang - Plaster	223081719-09	Yes	0.8% (ELAP 400 PC) by Valeriu Voicu on 08/07/23
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Chrysotile 0.8 % Other Material: Cellulose Trace, Non-fibrous 99.2%			
40 20 Location: Exterior, Main Entrance Overhang - Plaster	223081719-10	Yes	0.3% (ELAP 400 PC) by Valeriu Voicu on 08/07/23
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Chrysotile 0.3 % Other Material: Non-fibrous 99.7%			
41 20 Location: Exterior, Main Entrance Overhang - Plaster	223081719-11	Yes	0.5% (ELAP 400 PC) by Valeriu Voicu on 08/07/23
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Chrysotile 0.5 % Other Material: Cellulose Trace, Non-fibrous 99.5%			

Reporting Notes:

Analyzed by: Valeriu Voicu
Date: 8/7/2023



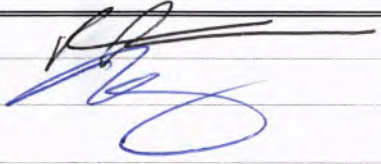
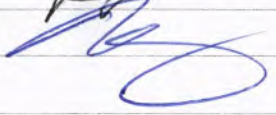
Reviewed by: Karol H. Lu



*NAD/NSD =no asbestos detected; NA =not analyzed; NA/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Olympus, Model BH-2 Pol Scope, Microscope, Serial #: 229915, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

Adelaide Environmental Health Associates, Inc

1511 Route 22, Suite C24
Brewster, NY 10509
845-278-7710
845-278-7750 - fax

Site Address: Meadow Pond ES			Date: 08/04/23	Inspector(s) Philip J. Page		
185 Smith Ridge Road						
South Salem, NY 10590			Project #: KGD-RM:23164.05-IN			
Sample ID #	Homogeneous Area	Floor Level	Sample Location/Description	Quantity (In Feet)	Friable NonFriable	Condition g, d, sd
31	16		Room O-3, WALL - PEG BOARD			
32	↓		↓ ↓ ↓			
33	17		FLOOR, 1x1 RED - FLOOR TILE + MASTIC			
34	↓		↓ ↓ ↓			
35	18		Room B-10, 1x1 BEIGE-			
36	↓		↓ ↓ ↓			
37	19		EXTERIOR, Room O-3, WINDOW - CAULK			
38	↓		↓ ↓ ↓ ↓			
39	20		MAIN ENTRANCE OVERHANG - PLASTER			
40	↓		↓ ↓ ↓			
41	↓		↓ ↓ ↓			
223081719						
Special Instructions/ Turnaround Time:				Relinquished by: 		
Stop at 1st Positive per Homogenous Area				Received by:  8/7/23 0950		
24 HR TAT				Relinquished by:		
E-Mail Results to AdelaideLabResults@adelaidellc.com & ppage@adelaidellc.com				Received by:		

APPENDIX E
XRF READINGS

Reading #	Date	Time	Space Type	Floor	Room	Component	Side	Substrate	Color	Condition	Lead Concentration (mg/cm2)	Result
1	7/24/2023	7:38:36	School		Calibration						1.1	Positive
2	7/24/2023	7:38:56	School		Calibration						1.1	Positive
3	7/24/2023	7:39:16	School		Calibration						1.1	Positive
4	7/24/2023	7:42:27	School	1st Floor	Multi Purpose Room	Wall	A	CMU	Beige	Intact	0.1	Negative
5	7/24/2023	7:43:01	School	1st Floor	Multi Purpose Room	Structural Beam	Ceiling	Metal	White	Intact	0.2	Negative
6	7/24/2023	7:46:13	School	1st Floor	A Wing	Soffit	Ceiling	Sheetrock	White	Intact	0.2	Negative
7	7/24/2023	7:46:44	School	1st Floor	A Wing	Wall	B	Sheetrock	White	Intact	0.2	Negative
8	7/24/2023	7:47:28	School	1st Floor	A Wing	Wall	C	Sheetrock	White	Intact	0.1	Negative
9	7/24/2023	7:47:48	School	1st Floor	A Wing	Window Case	C	Metal	White	Intact	0	Negative
10	7/24/2023	7:52:33	School	1st Floor	B Wing	Door Case	A	Metal	White	Intact	0.3	Negative
11	7/24/2023	7:53:09	School	1st Floor	B Wing	Soffit	Ceiling	Sheetrock	White	Intact	0	Negative
12	7/24/2023	7:54:00	School	1st Floor	B Wing	Wall	B	Sheetrock	White	Intact	0.1	Negative
13	7/24/2023	7:54:34	School	1st Floor	B Wing	Wall	C	Sheetrock	White	Intact	0.3	Negative
14	7/24/2023	7:57:15	School	1st Floor	Library	Soffit	Ceiling	Sheetrock	White	Intact	0.1	Negative
15	7/24/2023	7:58:00	School	1st Floor	Library	Wall	A	Sheetrock	White	Intact	0.1	Negative
16	7/24/2023	7:59:40	School	1st Floor	D4	Wall	A	Sheetrock	White	Intact	0.6	Negative
17	7/24/2023	8:00:08	School	1st Floor	D4	Wall	B	Sheetrock	White	Intact	-0.1	Negative
18	7/24/2023	8:03:10	School	1st Floor	D12	Soffit	Ceiling	Sheetrock	White	Intact	0.1	Negative
19	7/24/2023	8:03:48	School	1st Floor	D12	Wall	C	Sheetrock	White	Intact	0.1	Negative
20	7/24/2023	8:06:46	School	1st Floor	Bathroom	Wall	A	CMU	White	Intact	0.3	Negative
21	7/24/2023	8:07:11	School	1st Floor	Bathroom	Door Case	A	Metal	White	Intact	0.2	Negative
22	7/24/2023	8:16:19	School	1st Floor	C Wing	Soffit	Ceiling	Sheetrock	White	Intact	0.2	Negative
23	7/24/2023	8:16:48	School	1st Floor	C Wing	Wall	B	Sheetrock	White	Intact	0.1	Negative
24	7/24/2023	8:18:18	School	1st Floor	Corridor	Wall	B	Sheetrock	White	Intact	0	Negative
25	7/24/2023	8:20:35	School	1st Floor	Gym	Wall	A	CMU	Cream	Intact	0	Negative
26	7/24/2023	8:21:35	School	1st Floor	Gym	Structural Beam	A	Metal	Cream	Fair	-0.1	Negative
27	7/24/2023	8:23:49	School	1st Floor	Cafeteria	Wall	C	CMU	White	Intact	0.2	Negative
28	7/24/2023	8:25:57	School		Exterior	Ceiling	Ceiling	Plaster	White	Intact	0.1	Negative
29	7/24/2023	8:26:49	School		Calibration						1.1	Positive
30	7/24/2023	8:27:09	School		Calibration						1	Positive
31	7/24/2023	8:27:29	School		Calibration						1	Positive

Reading #	Date	Time	Space Type	Floor	Room	Component	Side	Substrate	Color	Condition	Lead Concentration (mg/cm2)	Result
1	8/4/2023	7:48:39	School		Calibration						1	Positive
2	8/4/2023	7:48:53	School		Calibration						1	Positive
3	8/4/2023	7:49:06	School		Calibration						1.1	Positive
4	8/4/2023	7:50:45	School	1st Floor	O-3	Wall	B	Peg Board	White	Intact	0.1	Negative
5	8/4/2023	7:51:03	School	1st Floor	O-3	Wall	C	Sheetrock	White	Fair	0.1	Negative
6	8/4/2023	7:51:32	School	1st Floor	O-3	Radiator Cover	C	Metal	Cream	Intact	0.2	Negative
7	8/4/2023	8:01:14	School	1st Floor	E-3-A	Wall	A	CMU	White	Fair	0.2	Negative
8	8/4/2023	8:01:29	School	1st Floor	E-3-A	Wall	B	CMU	White	Fair	0.3	Negative
9	8/4/2023	8:01:42	School	1st Floor	E-3-A	Wall	D	CMU	White	Fair	0.2	Negative
10	8/4/2023	8:02:10	School	1st Floor	E-3-A	Door Case	A	Metal	White	Intact	0.6	Negative
11	8/4/2023	8:11:47	School	1st Floor	B-10	Door Case	A	Metal	White	Intact	0.1	Negative
12	8/4/2023	8:12:06	School	1st Floor	B-10	Door	A	Metal	Grey	Intact	0.1	Negative
13	8/4/2023	8:12:36	School	1st Floor	B-10	Wall	A	Sheetrock	White	Fair	0.2	Negative
14	8/4/2023	8:12:49	School	1st Floor	B-10	Wall	B	Sheetrock	White	Fair	0.2	Negative
15	8/4/2023	8:23:20	School		Exterior	Ceiling	Ceiling	Plaster	White	Fair	0.1	Negative
16	8/4/2023	8:24:13	School		Calibration						1	Positive
17	8/4/2023	8:24:27	School		Calibration						1	Positive
18	8/4/2023	8:24:41	School		Calibration						1	Positive

APPENDIX F
PCB LOCATION MAP(S)

CLIENT:
KG+D Architects, PC
 285 Main Street
 Mount Kisco, New York 10549

SED Project #
66-01-01-03-0-007-016

SURVEY LOCATION:
Meadow Pond ES
 185 Smith Ridge Road
 South Salem, New York 10590

DATE: 08/16/2023

DRAWING VERSION: No. 1

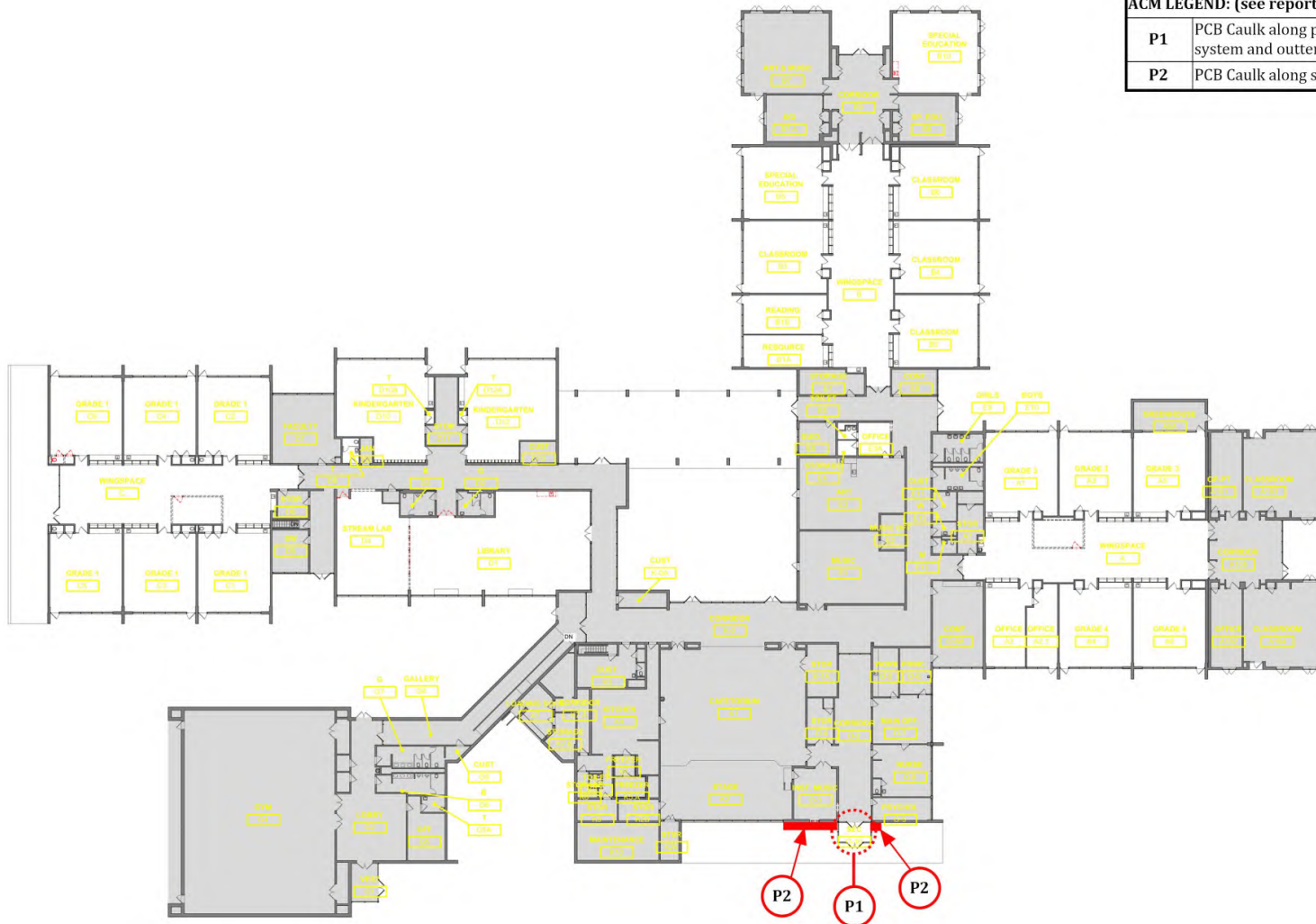
ISSUED FOR:
 Limited HazMat Survey

ADELAIDE PROJECT NO.:
 KGD-RM:23164.05-IN

DRAWING PREPARED BY:
 PJP

PCB-01

ACM LEGEND: (see report for details)	
P1	PCB Caulk along perimeter of inner door system and outer curtain wall system
P2	PCB Caulk along sidewalk to the building



First Floor Key Plan - Limited PCB Locations

PCB locations identified on this drawing are ONLY limited to the scope of work provided
 Drawing Not to Scale

APPENDIX G
PCB ANALYTICAL RESULTS



Tuesday, August 01, 2023

Attn: Stephanie Soter
Adelaide Environmental Health Assoc, Inc
1511 Route 22, Suite C24
Brewster, NY 10509

Project ID: KGD-RM-23164.05-IN
SDG ID: GCO58058
Sample ID#s: CO58058 - CO58059

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

A handwritten signature in black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Sample Id Cross Reference

August 01, 2023

SDG I.D.: GCO58058

Project ID: KGD-RM-23164.05-IN

Client Id	Lab Id	Matrix
P1	CO58058	CAULK
P2	CO58059	CAULK



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Report

August 01, 2023

FOR: Attn: Stephanie Soter
 Adelaide Environmental Health Assoc, Inc
 1511 Route 22, Suite C24
 Brewster, NY 10509

Sample Information

Matrix: CAULK
 Location Code: ADELAIDE
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

07/24/23
 07/25/23

Time

16:20

Laboratory Data

SDG ID: GCO58058
 Phoenix ID: CO58058

Project ID: KGD-RM-23164.05-IN
 Client ID: P1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				07/26/23		/R/AC1/M/SW3540C
<u>PCB (Soxhlet SW3540C)</u>							
PCB-1016	ND	57000	ug/Kg	100	07/28/23	SC	SW8082A
PCB-1221	ND	57000	ug/Kg	100	07/28/23	SC	SW8082A
PCB-1232	ND	57000	ug/Kg	100	07/28/23	SC	SW8082A
PCB-1242	ND	57000	ug/Kg	100	07/28/23	SC	SW8082A
PCB-1248	ND	57000	ug/Kg	100	07/28/23	SC	SW8082A
PCB-1254	320000	57000	ug/Kg	100	07/28/23	SC	SW8082A
PCB-1260	ND	57000	ug/Kg	100	07/28/23	SC	SW8082A
PCB-1262	ND	57000	ug/Kg	100	07/28/23	SC	SW8082A
PCB-1268	ND	57000	ug/Kg	100	07/28/23	SC	SW8082A
<u>QA/QC Surrogates</u>							
% DCBP	Diluted Out		%	100	07/28/23	SC	30 - 150 %
% DCBP (Confirmation)	Diluted Out		%	100	07/28/23	SC	30 - 150 %
% TCMX	Diluted Out		%	100	07/28/23	SC	30 - 150 %
% TCMX (Confirmation)	Diluted Out		%	100	07/28/23	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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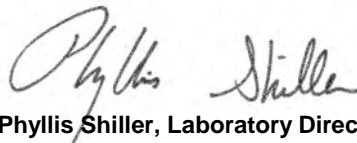
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director

August 01, 2023

Reviewed and Released by: Phyllis Shiller, Laboratory Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Report

August 01, 2023

FOR: Attn: Stephanie Soter
 Adelaide Environmental Health Assoc, Inc
 1511 Route 22, Suite C24
 Brewster, NY 10509

Sample Information

Matrix: CAULK
 Location Code: ADELAIDE
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

07/24/23
 07/25/23

Time

16:20

Laboratory Data

SDG ID: GCO58058
 Phoenix ID: CO58059

Project ID: KGD-RM-23164.05-IN
 Client ID: P2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				07/26/23		/R/AC1/M/SW3540C
<u>PCB (Soxhlet SW3540C)</u>							
PCB-1016	ND	8100000	ug/Kg	20000	07/28/23	SC	SW8082A
PCB-1221	ND	8100000	ug/Kg	20000	07/28/23	SC	SW8082A
PCB-1232	ND	8100000	ug/Kg	20000	07/28/23	SC	SW8082A
PCB-1242	ND	8100000	ug/Kg	20000	07/28/23	SC	SW8082A
PCB-1248	ND	8100000	ug/Kg	20000	07/28/23	SC	SW8082A
PCB-1254	34000000	8100000	ug/Kg	20000	07/28/23	SC	SW8082A
PCB-1260	ND	8100000	ug/Kg	20000	07/28/23	SC	SW8082A
PCB-1262	ND	8100000	ug/Kg	20000	07/28/23	SC	SW8082A
PCB-1268	ND	8100000	ug/Kg	20000	07/28/23	SC	SW8082A
<u>QA/QC Surrogates</u>							
% DCBP	Diluted Out		%	20000	07/28/23	SC	30 - 150 %
% DCBP (Confirmation)	Diluted Out		%	20000	07/28/23	SC	30 - 150 %
% TCMX	Diluted Out		%	20000	07/28/23	SC	30 - 150 %
% TCMX (Confirmation)	Diluted Out		%	20000	07/28/23	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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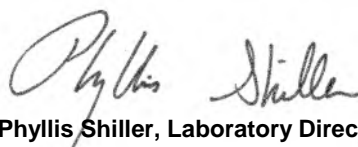
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

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Phyllis Shiller, Laboratory Director

August 01, 2023

Reviewed and Released by: Phyllis Shiller, Laboratory Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102



QA/QC Report

August 01, 2023

QA/QC Data


SDG I.D.: GCO58058

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 688729 (ug/Kg), QC Sample No: CO55866 10X (CO58058, CO58059)										
<u>Polychlorinated Biphenyls</u>										
PCB-1016	ND	170	100	90	10.5				40 - 140	30
PCB-1221	ND	170							40 - 140	30
PCB-1232	ND	170							40 - 140	30
PCB-1242	ND	170							40 - 140	30
PCB-1248	ND	170							40 - 140	30
PCB-1254	ND	170							40 - 140	30
PCB-1260	ND	170	103	96	7.0				40 - 140	30
PCB-1262	ND	170							40 - 140	30
PCB-1268	ND	170							40 - 140	30
% DCBP (Surrogate Rec)	124	%	104	111	6.5				30 - 150	30
% DCBP (Surrogate Rec) (Confirm)	101	%	139	83	50.5				30 - 150	30 r
% TCMX (Surrogate Rec)	113	%	104	90	14.4				30 - 150	30
% TCMX (Surrogate Rec) (Confirm)	97	%	112	83	29.7				30 - 150	30

r = This parameter is outside laboratory RPD specified recovery limits.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

- RPD - Relative Percent Difference
- LCS - Laboratory Control Sample
- LCSD - Laboratory Control Sample Duplicate
- MS - Matrix Spike
- MS Dup - Matrix Spike Duplicate
- NC - No Criteria
- Intf - Interference


 Phyllis Shiller, Laboratory Director
 August 01, 2023

Tuesday, August 01, 2023

Criteria: None

State: NY

Sample Criteria Exceedances Report

GCO58058 - ADELAIDE

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
CO58058	\$PCB_SOXR	PCB-1268	NY / Requested PCB RL /	ND	57000	1000	1000	ug/Kg
CO58058	\$PCB_SOXR	PCB-1221	NY / Requested PCB RL /	ND	57000	1000	1000	ug/Kg
CO58058	\$PCB_SOXR	PCB-1232	NY / Requested PCB RL /	ND	57000	1000	1000	ug/Kg
CO58058	\$PCB_SOXR	PCB-1242	NY / Requested PCB RL /	ND	57000	1000	1000	ug/Kg
CO58058	\$PCB_SOXR	PCB-1248	NY / Requested PCB RL /	ND	57000	1000	1000	ug/Kg
CO58058	\$PCB_SOXR	PCB-1254	NY / Requested PCB RL /	320000	57000	1000	1000	ug/Kg
CO58058	\$PCB_SOXR	PCB-1260	NY / Requested PCB RL /	ND	57000	1000	1000	ug/Kg
CO58058	\$PCB_SOXR	PCB-1016	NY / Requested PCB RL /	ND	57000	1000	1000	ug/Kg
CO58058	\$PCB_SOXR	PCB-1262	NY / Requested PCB RL /	ND	57000	1000	1000	ug/Kg
CO58059	\$PCB_SOXR	PCB-1268	NY / Requested PCB RL /	ND	8100000	1000	1000	ug/Kg
CO58059	\$PCB_SOXR	PCB-1221	NY / Requested PCB RL /	ND	8100000	1000	1000	ug/Kg
CO58059	\$PCB_SOXR	PCB-1232	NY / Requested PCB RL /	ND	8100000	1000	1000	ug/Kg
CO58059	\$PCB_SOXR	PCB-1242	NY / Requested PCB RL /	ND	8100000	1000	1000	ug/Kg
CO58059	\$PCB_SOXR	PCB-1248	NY / Requested PCB RL /	ND	8100000	1000	1000	ug/Kg
CO58059	\$PCB_SOXR	PCB-1254	NY / Requested PCB RL /	34000000	8100000	1000	1000	ug/Kg
CO58059	\$PCB_SOXR	PCB-1260	NY / Requested PCB RL /	ND	8100000	1000	1000	ug/Kg
CO58059	\$PCB_SOXR	PCB-1262	NY / Requested PCB RL /	ND	8100000	1000	1000	ug/Kg
CO58059	\$PCB_SOXR	PCB-1016	NY / Requested PCB RL /	ND	8100000	1000	1000	ug/Kg

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

August 01, 2023

SDG I.D.: GCO58058

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



NY Temperature Narration

August 01, 2023

SDG I.D.: GCO58058

The samples in this delivery group were received at 1.9°C.
(Note acceptance criteria for relevant matrices is above freezing up to 6°C)

1.9 we
yolk

Page 1 of 1

Phoenix Environmental Laboratories, Inc.

587 East Middle Turnpike, PO Box 370
Manchester, CT 06040
ph. (860) 645-1102
fx. (860) 645-0823

Field Chain-of-Custody Record

Phoenix Project No. _____

Analysis Turnaround: 7 Day

Company: Adelaide Environmental
1511 Route 22, Suite C24
Brewster, NY 10509

Sampled By (Print): Philip J. Page

Sampled By (Sign): [Signature]

Invoice to: Stephanie Soter

Project #: KGD-RM:23164.05-IN

Results Send Via: AdelaideLabResults@adelaidellc.com

Project ID: Meadow Pond ES - Bond Work

Cc Results: ppage@adelaidellc.com

SAMPLE #	LOCATION	SAMPLE DATE	MATRIX	ANALYSIS REQUESTED	CONTAINER
P1	Exterior, Main Entrance, Vestibule Curtain Wall, along perimeter	7/24/2023	Caulk	PCB	BAG 58058
P2	Exterior, Main Entrance, Sidewalk, along building	7/24/2023	Caulk	PCB	BAG 58059

Comments

Cool 4°C	<input type="checkbox"/>	HNO3	<input type="checkbox"/>	H2SO4	<input type="checkbox"/>	NaOH	<input type="checkbox"/>	NONE	<input type="checkbox"/>	FROZEN	<input type="checkbox"/>
_____ Samples Relinquished By	<u>7/24/23</u> Date/Time	_____ Samples Received By Lab	<u>7/25/23</u> Date/Time	Temperature on Receipt _____ °C							

[Signature]
[Signature]

[Signature] 7/25 16:20



Monday, August 14, 2023

Attn: Philip Page
Adelaide Environmental Health Assoc, Inc
1511 Route 22, Suite C24
Brewster, NY 10509

Project ID: MEADOW POND ES-BOND WORK
SDG ID: GCO67896
Sample ID#s: CO67896

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

A handwritten signature in black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

Phyllis Shiller

Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

Monday, August 14, 2023

Criteria: None

State: NY

Sample Criteria Exceedances Report

GCO67896 - ADELAIDE

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
CO67896	\$PCB_SOXR	PCB-1254	NY / Requested PCB RL /	11000	980	1000	1000	ug/Kg

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Sample Id Cross Reference

August 14, 2023

SDG I.D.: GCO67896

Project ID: MEADOW POND ES-BOND WORK

Client Id	Lab Id	Matrix
P3	CO67896	CAULK



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Report

August 14, 2023

FOR: Attn: Philip Page
 Adelaide Environmental Health Assoc, Inc
 1511 Route 22, Suite C24
 Brewster, NY 10509

Sample Information

Matrix: CAULK
 Location Code: ADELAIDE
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

08/04/23
 08/07/23

Time

16:30

Laboratory Data

SDG ID: GCO67896
 Phoenix ID: CO67896

Project ID: MEADOW POND ES-BOND WORK
 Client ID: P3

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				08/10/23		R/AC1/AVSW3540C
<u>PCB (Soxhlet SW3540C)</u>							
PCB-1016	ND	980	ug/Kg	1	08/11/23	SC	SW8082A
PCB-1221	ND	980	ug/Kg	1	08/11/23	SC	SW8082A
PCB-1232	ND	980	ug/Kg	1	08/11/23	SC	SW8082A
PCB-1242	ND	980	ug/Kg	1	08/11/23	SC	SW8082A
PCB-1248	ND	980	ug/Kg	1	08/11/23	SC	SW8082A
PCB-1254	11000	980	ug/Kg	1	08/11/23	SC	SW8082A
PCB-1260	ND	980	ug/Kg	1	08/11/23	SC	SW8082A
PCB-1262	ND	980	ug/Kg	1	08/11/23	SC	SW8082A
PCB-1268	ND	980	ug/Kg	1	08/11/23	SC	SW8082A
<u>QA/QC Surrogates</u>							
% DCBP	69		%	1	08/11/23	SC	30 - 150 %
% DCBP (Confirmation)	63		%	1	08/11/23	SC	30 - 150 %
% TCMX	53		%	1	08/11/23	SC	30 - 150 %
% TCMX (Confirmation)	55		%	1	08/11/23	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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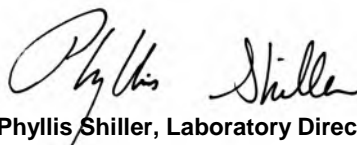
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
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Phyllis Shiller, Laboratory Director

August 14, 2023

Reviewed and Released by: Anil Makol, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102



QA/QC Report

August 14, 2023

QA/QC Data

SDG I.D.: GCO67896

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 691790 (ug/Kg), QC Sample No: CO67619 10X (CO67896)										
<u>Polychlorinated Biphenyls</u>										
PCB-1016	ND	170	82	49	50.4				40 - 140	30 r
PCB-1221	ND	170							40 - 140	30
PCB-1232	ND	170							40 - 140	30
PCB-1242	ND	170							40 - 140	30
PCB-1248	ND	170							40 - 140	30
PCB-1254	ND	170							40 - 140	30
PCB-1260	ND	170	83	44	61.4				40 - 140	30 r
PCB-1262	ND	170							40 - 140	30
PCB-1268	ND	170							40 - 140	30
% DCBP (Surrogate Rec)	101	%	101	60	50.9				30 - 150	30 r
% DCBP (Surrogate Rec) (Confirm)	89	%	89	47	61.8				30 - 150	30 r
% TCMX (Surrogate Rec)	83	%	84	48	54.5				30 - 150	30 r
% TCMX (Surrogate Rec) (Confirm)	85	%	87	51	52.2				30 - 150	30 r

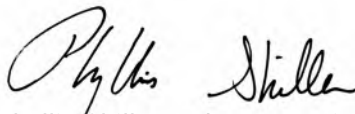
Comment:

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.

r = This parameter is outside laboratory RPD specified recovery limits.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

- RPD - Relative Percent Difference
- LCS - Laboratory Control Sample
- LCSD - Laboratory Control Sample Duplicate
- MS - Matrix Spike
- MS Dup - Matrix Spike Duplicate
- NC - No Criteria
- Intf - Interference


 Phyllis Shiller, Laboratory Director
 August 14, 2023



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

August 14, 2023

SDG I.D.: GCO67896

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



NY Temperature Narration

August 14, 2023

SDG I.D.: GCO67896

The samples in this delivery group were received at 1.7°C.
(Note acceptance criteria for relevant matrices is above freezing up to 6°C)

Phoenix Environmental Laboratories, Inc.

587 East Middle Turnpike, PO Box 370
 Manchester, CT 06040
 ph. (860) 645-1102
 fx. (860) 645-0823

Field Chain-of-Custody Record

Phoenix Project No. _____
 Analysis Turnaround: 7 Day

Company: Adelaide Environmental
1511 Route 22, Suite C24
Brewster, NY 10509

Sampled By (Print): Philip J. Page
 Sampled By (Sign):

Invoice to: Stephanie Soter

Project #: KGD-RM:23164.05-IN
 Project ID: Meadow Pond ES - Bond Work

Results Send Via: AdelaideLabResults@adelaidellc.com

Cc Results: ppage@adelaidellc.com

67896

SAMPLE #	LOCATION	SAMPLE DATE	MATRIX	ANALYSIS REQUESTED	CONTAINER
P3	Exterior, Room O-3, Window	8/4/2023	Caulk	PCB	BAG

Comments

Cool 4°C
 HNO3
 H2SO4
 NaOH
 NONE
 FROZEN
 Samples Relinquished By: 8/4/23
 Date/Time
 Samples Received By Lab: 8/7/23
 Date/Time
 Temperature on Receipt: _____ °C

1900
 JPL 8/7/23 16:30
 1.7 WCTPK

APPENDIX H
PERSONNEL AND LABORATORY CERTIFICATIONS

WE ARE YOUR DOL



**Department
of Labor**

DIVISION OF SAFETY & HEALTH LICENSE AND CERTIFICATE UNIT, STATE OFFICE CAMPUS, BLDG. 12, ALBANY, NY 12226

ASBESTOS HANDLING LICENSE

Adelaide Environmental Health Associates, Inc.
1511 Route 22, Suite C24, Brewster, NY, 10509

License Number: 29305

License Class: RESTRICTED

Date of Issue: 06/07/2023

Expiration Date: 07/31/2024

Duly Authorized Representative: John Soter

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

A handwritten signature in black ink, appearing to read "Amy Phillips".

Amy Phillips, Director
For the Commissioner of Labor

EXCELSIOR

United States Environmental Protection Agency

This is to certify that

ADELAIDE ENVIRONMENTAL HEALTH ASSOCIATES
INC

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires September 08, 2025

LBP-15081-2

Certification #

August 25, 2022

Issued On



A handwritten signature in black ink that reads "Michelle Price".

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that



Adelaide Environmental Health Associates, Inc

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint renovation, repair, and painting activities pursuant to 40 CFR Part 745.89

In the Jurisdiction of:

All EPA Administered States, Tribes, and Territories

This certification is valid from the date of issuance and expires December 05, 2027

NAT-15081-3

Certification #

August 03, 2022

Issued On



Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

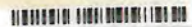
STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



PHILIP J PAGE
CLASS(EXPIRES)
C ATEC(05/24) D INSP(05/24)
H PM (05/24) I PD (05/24)

CERT# 12-10888
DMV# 216687928

MUST BE CARRIED ON ASBESTOS PROJECTS



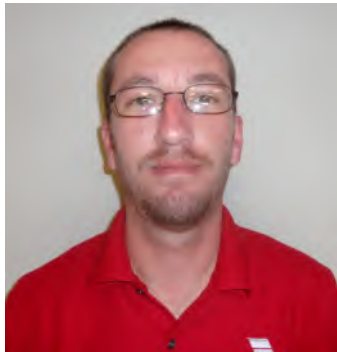
01213 006774130 62

EYES BRO
HAIR BLN
HGT 6' 00"

IF FOUND RETURN TO:
NYS DOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12240

United States Environmental Protection Agency

This is to certify that



Philip J Page

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226 as:

Inspector

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires March 23, 2026

LBP-I-1172697-3

Certification #

January 25, 2023

Issued On



A handwritten signature in black ink that reads "Ben Conetta".

Ben Conetta, Chief

Chemicals and Multimedia Programs Branch

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2024
Issued April 01, 2022
Revised March 30, 2023

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

*MS. KAROL H. LU
AMERICA SCIENCE TEAM NEW YORK, INC
117 EAST 30TH ST
NEW YORK, NY 10016*

NY Lab Id No: 11480

*is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:*

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual



Serial No.: 66402

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at <https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/>, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2024
Issued April 01, 2022
Revised March 30, 2023

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. PHYLLIS SHILLER
PHOENIX ENVIRONMENTAL LABS
587 EAST MIDDLE TURNPIKE
MANCHESTER, CT 06040

NY Lab Id No: 11301

*is hereby APPROVED as an Environmental Laboratory in conformance with the
National Environmental Laboratory Accreditation Conference Standards (2016) for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:*

Polychlorinated Biphenyls

Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1262 (PCB-1262) in Oil	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A
Aroclor 1268 (PCB-1268) in Oil	EPA 8082A
PCB 101	EPA 8082A
PCB 105	EPA 8082A
PCB 118	EPA 8082A
PCB 128	EPA 8082A
PCB 138	EPA 8082A
PCB 153	EPA 8082A
PCB 170	EPA 8082A
PCB 18	EPA 8082A
PCB 180	EPA 8082A
PCB 183	EPA 8082A
PCB 184	EPA 8082A
PCB 187	EPA 8082A
PCB 195	EPA 8082A
PCB 206	EPA 8082A
PCB 209	EPA 8082A
PCB 28	EPA 8082A
PCB 44	EPA 8082A
PCB 49	EPA 8082A
PCB 52	EPA 8082A
PCB 66	EPA 8082A
PCB 8	EPA 8082A
PCB 87	EPA 8082A
PCB Congeners, Total	EPA 8082A

Serial No.: 66336

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at <https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/>, by phone (518) 485-5570 or by email to elap@health.ny.gov.



NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2024
Issued April 01, 2022
Revised March 30, 2023

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. PHYLLIS SHILLER
PHOENIX ENVIRONMENTAL LABS
587 EAST MIDDLE TURNPIKE
MANCHESTER, CT 06040

NY Lab Id No: 11301

*is hereby APPROVED as an Environmental Laboratory in conformance with the
National Environmental Laboratory Accreditation Conference Standards (2016) for the category
ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:*

Acrylates

Acrylonitrile	EPA TO-15
Methyl methacrylate	EPA TO-15

Chlorinated Hydrocarbons

1,2,4-Trichlorobenzene	EPA TO-15
Hexachlorobutadiene	EPA TO-15
Hexachloroethane	EPA TO-15

Metals I

Lead, Total	EPA 29 (6010)
	EPA 7010

Polychlorinated Biphenyls

PCBs and Aroclors	EPA TO-10A
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Polynuclear Aromatics

Naphthalene	EPA TO-15
-------------	-----------

Purgeable Aromatics

1,2,4-Trimethylbenzene	EPA TO-15
1,2-Dichlorobenzene	EPA TO-15
1,3,5-Trimethylbenzene	EPA TO-15
1,3-Dichlorobenzene	EPA TO-15
1,4-Dichlorobenzene	EPA TO-15
2-Chlorotoluene	EPA TO-15
Benzene	EPA TO-15
Chlorobenzene	EPA TO-15
Ethyl benzene	EPA TO-15
Isopropylbenzene	EPA TO-15
m/p-Xylenes	EPA TO-15



Serial No.: 66338

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at <https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/>, by phone (518) 485-5570 or by email to elap@health.ny.gov.



BID FORM CONTRACT NO. 1 - GENERAL CONSTRUCTION WORK
FOR
ADDITIONS AND ALTERATIONS TO MEADOW POND ELEMENTARY SCHOOL

Katonah-Lewisboro Union Free School District
District Administration Office
60 North Salem Road
Cross River, New York 10518
Attention: Lisa Herlihy, Interim Assistant Superintendent for Business

1. The Undersigned hereby declares that it has carefully examined all Bidding and Contract Documents and has inspected the actual location of Work, together with the local sources of supply, and has satisfied itself as to all quantities and conditions, and understands that in signing this Proposal, it waives all rights to plead any misunderstanding regarding the same.
2. The Undersigned further understands and agrees that it is to do, perform and complete all the Work in accordance with the Contract Documents and Contract and to accept in full compensation therefor, the amount of the Base Bid, modified by such additive or deductive alternatives, if any, as are accepted by the Owner.
3. In submitting this Bid, the Undersigned agrees:
 - a. To hold the Bid open for forty-five (45) days after Bid Opening.
 - b. To accept the provisions of the Instructions to Bidders.
 - c. To enter into and execute a Contract within ten (10) days of the Notice of Award issue date, and to simultaneously furnish Performance and Labor and Material Bonds.
 - d. To commence the Work immediately upon receipt of Notice of Award.
4. The Undersigned agrees that the Work proposed herein will be Substantially Complete by the dates indicated in specification Section 011000 - "Summary" and in the Project Milestone Schedule following Section 011000.
5. The Undersigned understands that the Owner reserves the right to accept or reject any or all Bids and to waive any informalities in the bidding.
6. The Undersigned acknowledges the receipt of the following addenda, but agrees that it is bound by all addenda whether or not listed herein:

Addendum Number

Date of Addendum

7. **BASE BID**

(Name of Bidder)

All labor, material, services and equipment necessary for completion of the Work shown on the Drawings and the Technical Specifications for General Construction Work:

\$ _____ (In numbers)

_____ Dollars
(in words)

8. **ALTERNATES**

The Undersigned agrees to provide all work in accordance with the requirements of the Specifications and the Drawings and includes all costs of related coordination, modification, or adjustment for the following:

ALTERNATE NO. 1: LIBRARY AND STREAM LAB RENOVATIONS

ADD _____ Dollars (\$ _____)

ALTERNATE NO. 2: REMAINING FINISHES OF WINGS A, B, AND C

ADD _____ Dollars (\$ _____)

ALTERNATE NO. 3: WINDOW REPLACEMENT

ADD _____ Dollars (\$ _____)

ALTERNATE NO. 4: SIGNAGE AND INFRASTRUCTURE UPGRADES

ADD _____ Dollars (\$ _____)

9. **UNIT PRICES** - none

10. **ALLOWANCES** - none

The Undersigned has attached the following documents to this Bid:

- a. Certificate of Compliance with the Iran Divestment Act or Declaration of Bidders Inability to Provide Certificate of Compliance with the Iran Divestment Act
- b. Non-Collusive Form
- c. Sexual Harassment Prevention Certification Form
- d. Bid Security
- e. Insurance Coverage Certification Form
- f. Statement of Bidder's Qualifications (submit in separate envelope).

(Name of Bidder)

Legal name of person, partnership, joint venture, limited liability company, or corporation (please type)

(If corporation, affix
corporate seal)

Address (please type)

Federal ID No. or Social Security No. (please type)

Phone No. (please type)

e-mail address for company (please type)

Company URL

Name and title of signer (please type)

Signature

Date

If a Corporation
Name

Address

_____, PRESIDENT _____

_____, SECRETARY _____

_____, TREASURER _____

If a Partnership
Name of Partners

Address

If a Joint Venture
Name of Members

Address

If an Individual
Name of Individual

Address

(Name of Bidder)

If a Limited Liability Company (LLC)
Name of Members

Address

IF AWARDED THE CONTRACT:

Contract Signatory (name and title)

Project Manager (name, e-mail address and cell phone number)

BID FORM CONTRACT NO. 2 - PLUMBING WORK
FOR
ADDITIONS AND ALTERATIONS TO MEADOW POND ELEMENTARY SCHOOL

Katonah-Lewisboro Union Free School District
District Administration Office
60 North Salem Road
Cross River, New York 10518
Attention: Lisa Herlihy, Interim Assistant Superintendent for Business

1. The Undersigned hereby declares that it has carefully examined all Bidding and Contract Documents and has inspected the actual location of Work, together with the local sources of supply, and has satisfied itself as to all quantities and conditions, and understands that in signing this Proposal, it waives all rights to plead any misunderstanding regarding the same.
2. The Undersigned further understands and agrees that it is to do, perform and complete all the Work in accordance with the Contract Documents and Contract and to accept in full compensation therefor, the amount of the Base Bid, modified by such additive or deductive alternatives, if any, as are accepted by the Owner.
3. In submitting this Bid, the Undersigned agrees:
 - a. To hold the Bid open for forty-five (45) days after Bid Opening.
 - b. To accept the provisions of the Instructions to Bidders.
 - c. To enter into and execute a Contract within ten (10) days of the Notice of Award issue date, and to simultaneously furnish Performance and Labor and Material Bonds.
 - d. To commence the Work immediately upon receipt of Notice of Award.
4. The Undersigned agrees that the Work proposed herein will be Substantially Complete by the dates indicated in specification Section 011000 - "Summary" and in the Project Milestone Schedule following Section 011000.
5. The Undersigned understands that the Owner reserves the right to accept or reject any or all Bids and to waive any informalities in the bidding.
6. The Undersigned acknowledges the receipt of the following addenda, but agrees that it is bound by all addenda whether or not listed herein:

Addendum Number

Date of Addendum

7. **BASE BID**

(Name of Bidder)

All labor, material, services and equipment necessary for completion of the Work shown on the Drawings and the Technical Specifications for Plumbing Work:

\$ _____ (In numbers)

Dollars
(in words)

8. **ALTERNATES**

The Undersigned agrees to provide all work in accordance with the requirements of the Specifications and the Drawings and includes all costs of related coordination, modification, or adjustment for the following:

ALTERNATE NO. 1: LIBRARY AND STREAM LAB RENOVATIONS

ADD _____ Dollars (\$ _____)

ALTERNATE NO. 2: Not Applicable

ALTERNATE NO. 3: Not Applicable.

ALTERNATE NO. 4: SIGNAGE AND INFRASTRUCTURE UPGRADES

ADD _____ Dollars (\$ _____)

9. **UNIT PRICES** - none

10. **ALLOWANCES** - none

The Undersigned has attached the following documents to this Bid:

- a. Certificate of Compliance with the Iran Divestment Act or Declaration of Bidders Inability to Provide Certificate of Compliance with the Iran Divestment Act
- b. Non-Collusive Form
- c. Sexual Harassment Prevention Certification Form
- d. Bid Security
- e. Insurance Coverage Certification Form
- f. Statement of Bidder's Qualifications (submit in separate envelope).

Legal name of person, partnership, joint venture, limited liability company, or corporation (please type)

(If corporation, affix
corporate seal)

(Name of Bidder)

Address (please type)

Federal ID No. or Social Security No. (please type)

Phone No. (please type)

e-mail address for company (please type)

Company URL

Name and title of signer (please type)

Signature

Date

If a Corporation
Name

Address

_____, PRESIDENT _____

_____, SECRETARY _____

_____, TREASURER _____

If a Partnership
Name of Partners

Address

If a Joint Venture
Name of Members

Address

If an Individual
Name of Individual

Address

(Name of Bidder)

If a Limited Liability Company (LLC)
Name of Members

Address

IF AWARDED THE CONTRACT:

Contract Signatory (name and title)

Project Manager (name, e-mail address and cell phone number)

BID FORM CONTRACT NO. 3 - HVAC WORK
FOR
ADDITIONS AND ALTERATIONS TO MEADOW POND ELEMENTARY SCHOOL

Katonah-Lewisboro Union Free School District
District Administration Office
60 North Salem Road
Cross River, New York 10518
Attention: Lisa Herlihy, Interim Assistant Superintendent for Business

1. The Undersigned hereby declares that it has carefully examined all Bidding and Contract Documents and has inspected the actual location of Work, together with the local sources of supply, and has satisfied itself as to all quantities and conditions, and understands that in signing this Proposal, it waives all rights to plead any misunderstanding regarding the same.
2. The Undersigned further understands and agrees that it is to do, perform and complete all the Work in accordance with the Contract Documents and Contract and to accept in full compensation therefor, the amount of the Base Bid, modified by such additive or deductive alternatives, if any, as are accepted by the Owner.
3. In submitting this Bid, the Undersigned agrees:
 - a. To hold the Bid open for forty-five (45) days after Bid Opening.
 - b. To accept the provisions of the Instructions to Bidders.
 - c. To enter into and execute a Contract within ten (10) days of the Notice of Award issue date, and to simultaneously furnish Performance and Labor and Material Bonds.
 - d. To commence the Work immediately upon receipt of Notice of Award.
4. The Undersigned agrees that the Work proposed herein will be Substantially Complete by the dates indicated in specification Section 011000 - "Summary" and in the Project Milestone Schedule following Section 011000.
5. The Undersigned understands that the Owner reserves the right to accept or reject any or all Bids and to waive any informalities in the bidding.
6. The Undersigned acknowledges the receipt of the following addenda, but agrees that it is bound by all addenda whether or not listed herein:

Addendum Number

Date of Addendum

7. **BASE BID**

(Name of Bidder)

All labor, material, services and equipment necessary for completion of the Work shown on the Drawings and the Technical Specifications for HVAC Work:

\$ _____ (In numbers)

_____ Dollars
(in words)

8. **ALTERNATES**

The Undersigned agrees to provide all work in accordance with the requirements of the Specifications and the Drawings and includes all costs of related coordination, modification, or adjustment for the following:

ALTERNATE NO. 1: LIBRARY AND STREAM LAB RENOVATIONS

ADD _____ Dollars (\$ _____)

ALTERNATE NO. 2: Not Applicable

ALTERNATE NO. 3: Not Applicable.

ALTERNATE NO. 4: SIGNAGE AND INFRASTRUCTURE UPGRADES

ADD _____ Dollars (\$ _____)

9. **UNIT PRICES** - none

10. **ALLOWANCES** - none

The Undersigned has attached the following documents to this Bid:

- a. Certificate of Compliance with the Iran Divestment Act or Declaration of Bidders Inability to Provide Certificate of Compliance with the Iran Divestment Act
- b. Non-Collusive Form
- c. Sexual Harassment Prevention Certification Form
- d. Bid Security
- e. Insurance Coverage Certification Form
- f. Statement of Bidder's Qualifications (submit in separate envelope).

Legal name of person, partnership, joint venture, limited liability company, or corporation (please type)

(If corporation, affix
corporate seal)

(Name of Bidder)

Address (please type)

Federal ID No. or Social Security No. (please type)

Phone No. (please type)

e-mail address for company (please type)

Company URL

Name and title of signer (please type)

Signature

Date

If a Corporation
Name

Address

_____, PRESIDENT _____

_____, SECRETARY _____

_____, TREASURER _____

If a Partnership
Name of Partners

Address

If a Joint Venture
Name of Members

Address

If an Individual
Name of Individual

Address

(Name of Bidder)

If a Limited Liability Company (LLC)
Name of Members

Address

IF AWARDED THE CONTRACT:

Contract Signatory (name and title)

Project Manager (name, e-mail address and cell phone number)

BID FORM CONTRACT NO. 4 - ELECTRICAL WORK
FOR
ADDITIONS AND ALTERATIONS TO MEADOW POND ELEMENTARY SCHOOL

Katonah-Lewisboro Union Free School District
District Administration Office
60 North Salem Road
Cross River, New York 10518
Attention: Lisa Herlihy, Interim Assistant Superintendent for Business

1. The Undersigned hereby declares that it has carefully examined all Bidding and Contract Documents and has inspected the actual location of Work, together with the local sources of supply, and has satisfied itself as to all quantities and conditions, and understands that in signing this Proposal, it waives all rights to plead any misunderstanding regarding the same.
2. The Undersigned further understands and agrees that it is to do, perform and complete all the Work in accordance with the Contract Documents and Contract and to accept in full compensation therefor, the amount of the Base Bid, modified by such additive or deductive alternatives, if any, as are accepted by the Owner.
3. In submitting this Bid, the Undersigned agrees:
 - a. To hold the Bid open for forty-five (45) days after Bid Opening.
 - b. To accept the provisions of the Instructions to Bidders.
 - c. To enter into and execute a Contract within ten (10) days of the Notice of Award issue date, and to simultaneously furnish Performance and Labor and Material Bonds.
 - d. To commence the Work immediately upon receipt of Notice of Award.
4. The Undersigned agrees that the Work proposed herein will be Substantially Complete by the dates indicated in specification Section 011000 - "Summary" and in the Project Milestone Schedule following Section 011000.
5. The Undersigned understands that the Owner reserves the right to accept or reject any or all Bids and to waive any informalities in the bidding.
6. The Undersigned acknowledges the receipt of the following addenda, but agrees that it is bound by all addenda whether or not listed herein:

Addendum Number

Date of Addendum

7. **BASE BID**

(Name of Bidder)

All labor, material, services and equipment necessary for completion of the Work shown on the Drawings and the Technical Specifications for Electrical Work:

\$ _____ (In numbers)

Dollars
(in words)

8. **ALTERNATES**

The Undersigned agrees to provide all work in accordance with the requirements of the Specifications and the Drawings and includes all costs of related coordination, modification, or adjustment for the following:

ALTERNATE NO. 1: LIBRARY AND STREAM LAB RENOVATIONS

ADD _____ Dollars (\$ _____)

ALTERNATE NO. 2: REMAINING FINISHES OF WINGS A, B, AND C

ADD _____ Dollars (\$ _____)

ALTERNATE NO. 3: Not Applicable

ALTERNATE NO. 4: SIGNAGE AND INFRASTRUCTURE UPGRADES

ADD _____ Dollars (\$ _____)

9. **UNIT PRICES** - none

10. **ALLOWANCES** - none

The Undersigned has attached the following documents to this Bid:

- a. Certificate of Compliance with the Iran Divestment Act or Declaration of Bidders Inability to Provide Certificate of Compliance with the Iran Divestment Act
- b. Non-Collusive Form
- c. Sexual Harassment Prevention Certification Form
- d. Bid Security
- e. Insurance Coverage Certification Form
- f. Statement of Bidder's Qualifications (submit in separate envelope).

(Name of Bidder)

Legal name of person, partnership, joint venture, limited liability company, or corporation (please type)

(If corporation, affix
corporate seal)

Address (please type)

Federal ID No. or Social Security No. (please type)

Phone No. (please type)

e-mail address for company (please type)

Company URL

Name and title of signer (please type)

Signature

Date

If a Corporation
Name

Address

_____, PRESIDENT _____

_____, SECRETARY _____

_____, TREASURER _____

If a Partnership
Name of Partners

Address

If a Joint Venture
Name of Members

Address

If an Individual
Name of Individual

Address

(Name of Bidder)

If a Limited Liability Company (LLC)
Name of Members

Address

IF AWARDED THE CONTRACT:

Contract Signatory (name and title)

Project Manager (name, e-mail address and cell phone number)

CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

As a result of the Iran Divestment Act of 2012 (the "Act"), Chapter 1 of the 2012 Laws of New York, a new provision has been added to State Finance Law (SFL) § 165-a and New York General Municipal Law § 103-g, both effective April 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law) (the "Prohibited Entities List"). Pursuant to SFL § 165-a(3)(b), the initial list is expected to be issued no later than 120 days after the Act's effective date at which time it will be posted on the OGS website.

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

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

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

I, _____, being duly sworn, deposes and says that he/she is the _____ of the _____ Corporation and that neither the Bidder/ Contractor nor any proposed subcontractor is identified on the Prohibited Entities List.

SIGNED

SWORN to before me this

_____ day of _____

20__

Notary Public: _____

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

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

Name of the Bidder: _____

Address of Bidder: _____

Has bidder been involved in investment activities in Iran? _____

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

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

Have the investment activities ended? _____

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

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

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

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

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

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

SIGNED

SWORN to before me this

_____ day of _____ 20__

Notary Public: _____

NON-COLLUSIVE FORM
BID PROPOSAL CERTIFICATIONS

Firm Name _____

Business Address _____

Telephone Number _____ Date of Bid _____

I. General Bid Certification

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

II. Non-Collusive Bidding Certification

The following statement is made pursuant to Section 103-D of the General Municipal Law, as amended by Chapter 675 of the Laws of 1966, and Section 139-D of the State Finance Law, as amended by Chapter 675 of the Laws of 1966, and Section 2604 of the Public Authorities Law, as amended by Chapter 675 of the Laws of 1966.

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

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

Non-collusive bidding certification.

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

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

2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and,

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

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

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

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

The bidder affirms the above statement as true under the penalties of perjury.

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

Title: _____

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

22 March 2024
Issued for Bid

Katonah-Lewisboro Union Free School District
Additions and Alterations to Meadow Pond Elementary School
SED No. 66-01-01-03-0-007-016

Sexual Harassment Prevention Certification Form

By submission of this bid, the person signing on behalf of the bidder certifies, under penalty of perjury, that the bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees. Such policy shall, at a minimum, meet the requirements of Section 201-g of the Labor Law.

Bidder Name: _____

Bidder Address: _____

Signature: _____

Print Name and Title: _____

Date: _____

 **AIA[®] Document A310™ – 2010****Bid Bond****CONTRACTOR:***(Name, legal status and address)***SURETY:***(Name, legal status and principal place of business)***OWNER:***(Name, legal status and address)***BOND AMOUNT: \$****PROJECT:***(Name, location or address, and Project number, if any)*

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

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

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

ADDITIONS AND DELETIONS:

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

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

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

INSURANCE COVERAGE CERTIFICATION

_____ (name), President/CEO/Owner/Managing Member of _____ (bidder), hereby represents that the bidder currently has, or immediately upon being awarded the contract, will obtain insurance coverage, from an insurer licensed and admitted to do business in the State of New York, that meets the following requirements:

1. **Workers' Compensation, Paid Family Leave and NYS Disability Insurance**
Statutory Workers' Compensation (C-105.2 or U-26.3), NYS Paid Leave 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.

2. **Commercial General Liability Insurance**
\$1,000,000 per Occurrence/\$2,000,000 Aggregate with coverage for sexual misconduct
\$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.

3. **Owners Contractors Protective (OCP) Insurance:**
For Projects less than or equal to \$1,000,000 and work on 1 story (10 feet) only:
\$1,000,000 per occurrence, \$2,000,000 aggregate with the Owner as the named insured.

For Projects greater than \$1,000,000 and/or work above one story (10 feet):
\$2,000,000 per occurrence, \$4,000,000 aggregate with the Owner as the named insured.

The Owner will be the named insured on OCP Policies. There will be no additional insureds on any OCP Policies.

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

5. **Umbrella/Excess Insurance**
\$5,000,000 each occurrence and aggregate for general construction (including plumbing, electrical and HVAC) and no work at elevation (1 story or 10 feet) or Project values less than or equal to \$1,000,000.

\$10,000,000 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 or provide broader coverage over the General Liability and Automobile Liability coverages.

6. **Asbestos/Lead Abatement/Pollution Liability Insurance**

If the Project requires the removal of asbestos and/or hazardous materials, Contractor shall provide hazardous material liability insurance as follows:

\$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 provide pollution liability broadened coverage (ISO endorsement CA 9948 or CA 01 12), as well as proof of MCS 90. Coverage shall fulfill all requirements of this Article 10 and shall extend for a period of three (3) years following acceptance by the Owner of the Certificate of Completion.

7. **Testing Company Errors and Omission Insurance**

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

Insurance Representative's Acknowledgment:

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

Insurance Representative: _____

Address: _____

Are you an agent for the companies providing the coverage: Yes _____ No _____

Date: _____

Insurance Representative

Bidder's Acknowledgment:

I acknowledge that I have reviewed the insurance requirements for this bid and have considered the costs, if any, of procuring the required insurance and will be able to supply the insurance required in accordance with the bid, if it is awarded. I understand that a certificate of insurance must be submitted with my bid; and if it is not, the Owner may reject my bid and award to the next lowest bidder.

Firm Name: _____

Address: _____

Date: _____

Bidder's Signature

QUALIFICATIONS OF BIDDERS

Experience and Qualifications of the Bidder: Each bidder is required to submit the following documentation to demonstrate its experience and qualifications for the work of the Project for which a bid is submitted:

- a. A description of its experience with projects of comparative size, complexity, and cost, together with documentary evidence showing that said projects were completed to the Owner's satisfaction and were completed in a timely fashion;
- b. Documentation from each of the projects it has performed capital work in the last five (5) years concerning the bidder's:
 - (i) timeliness of performance of the work of the project
 - (ii) evidence that the project was completed to the Owner's satisfaction;
 - (iii) whether or not any extensions of time were requested by the contractor and whether or not such requests were granted;
 - (iv) whether litigation and/or arbitration was commenced by either the Owner or the bidder as a result of the work of the project performed by the bidder;
 - (v) whether any liens were filed on the project by subcontractors or material suppliers of the bidder;
 - (vi) whether the bidder was defaulted on the project by the owner;
 - (vii) whether the bidder made any claims for extra work on the project, including whether said claim resulted in a change order;
- c. Documentation evidencing the bidder's financial responsibility, including a certified financial statement prepared by a certified public accountant.
- d. Documentation evidencing the bidder's existence under the same name for the last five (5) years.
- e. Documentation evidencing the bidder's Worker's Compensation Experience Modification.

STATEMENT OF BIDDER'S QUALIFICATIONS

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

1. Name of Bidder

2. Type of Business Entity

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

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

5. List the persons who are directors, officers, owners, managerial employees or partners in the bidder's business.

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

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

8. Has the bidder been found guilty of any OSHA Violations? If the answer to this question is yes, describe the nature of the OSHA violation, an explanation of remediation or other steps taken regarding such violation(s).

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

10. Has the bidder been named as a party in any lawsuit arising from performance of work related to any project in which it has been engaged? If the answer to this question is yes, list all such lawsuits, the index number associated with said suit and the status of the lawsuit at the time of the submission of this bid.

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

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

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

14. Has the bidder, its officers, directors, owner and/or managerial employees been convicted of a crime or been the subject of a criminal indictment? If the answer to this question is yes, list the name of the individual convicted or indicted, the charge against the individual and the date of disposition of the charge.

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

16. Has the bidder bid on any projects in the last five years preceding the date of this bid submission? If the answer to this question is yes, list the projects bid on, whether said bid was awarded to the bidder and the expected date of commencement of the work for said project. For those projects listed, if the bidder was not awarded the contract, state whether the bidder was the lowest monetary bidder.

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

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

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

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

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

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

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

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

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

Dated:

By: _____
(Signature)

(Print Name and Title)

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

Notary Public

AGREEMENT made as of the ____ day of _____ in the year of Two Thousand Twenty _____.

BETWEEN the Owner
(Name and address)

and the Contractor:
(Name and address)

The Project is:
(Name and location)

The Architect is:
(Name and address)

The Construction Manager is:
(Name and address)

The Owner and Contractor agree as set forth below.

ARTICLE 1
THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, specifications, Addenda issued prior to execution of this Agreement, other documents listed in Article 9 of this Agreement and Modifications issued after execution of this Agreement; these form the Contract and are a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than Modifications, appears in Article 9.

ARTICLE 2
THE WORK OF THIS CONTRACT

The Contractor shall execute the entire Work described in the Contract Documents or reasonably inferable by the Contractor as necessary to produce the results intended by the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3
DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

3.1 The date of commencement of the work and substantial completion of the work of this contract shall be in accordance with the schedule set forth in the Project Manual.

3.2 Time is of the essence respecting the contract documents and all obligations thereunder.

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

ARTICLE 4
CONTRACT SUM

4.1 The Owner shall pay the Contractor in current funds for the Contractor's performance of the Contract the Contract Sum of \$_____, subject to additions and deductions as provided in the Contract Documents.

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

4.3 Unit prices are as set forth in Exhibit A hereto.

ARTICLE 5
PROGRESS PAYMENTS

5.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

5.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

All progress payments shall be based upon an estimate and a certificate, made by the Architect, of the materials furnished, installed, and suitably stored at the site and the work done by the Contractor, and payment shall be made in installments of ninety-five percent (95%) of the amount certified as earned so that, at the completion of the work, there will be a retainage of five percent (5%) of the Total Contract Sum. Retainage shall be paid to the Contractor upon final completion of the work of this contract. All progress payments made previous to the last and final payment shall be based on estimates and the right is hereby reserved by the Architect for the Owner to make all due and proper corrections in any payment for any previous error.

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

5.2.1 A current Sworn Statement from the Contractor setting forth all subcontractors and materialmen with whom the Contractor has subcontracted, the amount of such subcontract, the amount requested for any subcontractor or materialman in the application for payment and the amount to be paid to the Contractor from such progress payment.

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

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

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

5.3.1 Certified payroll for employees and employees of subcontractors performing work on the Project.

5.3.2 Copies of invoices submitted to the Contractor by its subcontractors and/or material suppliers.

ARTICLE 6
FINAL PAYMENT

Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when (1) the Contract has been fully performed including compliance with all provisions of the Contract Documents except for the Contractor's responsibility to correct nonconforming Work under Article 15(B) of the General Conditions and to satisfy other requirements, if any, which necessarily survive final payment; and (2) a final Certificate for Payment has been issued by the Architect; such final payment shall be made by the Owner not more than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows or as soon thereafter as is practicable.

ARTICLE 7
MISCELLANEOUS PROVISIONS

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

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

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

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

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

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

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

7.2.6 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 Paragraph 7.2, shall survive the final completion of the Work or the earlier termination of this Agreement. The Contractor acknowledges that the Owner is relying upon the Contractor's skill and experience in connection with the Work called for hereunder.

ARTICLE 8
TERMINATION OR SUSPENSION

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

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

ARTICLE 9
ENUMERATION OF CONTRACT DOCUMENTS

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

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

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

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

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

9.1.5 The Addenda, if any, are as follows:

Addendum No.	Date	Number of Pages
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This Agreement is entered into as of the day and year first written above and is executed in at least three original copies of which one is to be delivered to the Contractor, one to the Architect for use in the administration of the Contract, and the remainder to the Owner.

OWNER

CONTRACTOR

By: _____

(printed name and title)

By: _____

(printed name and title)



AIA[®] Document A312[®] – 2010

Performance Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

CONSTRUCTION CONTRACT

Date:

Amount: \$

Description:

(Name and location)

BOND

Date:

(Not earlier than Construction Contract Date)

Amount: \$

Modifications to this Bond: None See Section 16

CONTRACTOR AS PRINCIPAL

Company: *(Corporate Seal)*

Signature: _____

Name and

Title:

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

SURETY

Company: *(Corporate Seal)*

Signature: _____

Name and

Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:**OWNER'S REPRESENTATIVE:**

(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:

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

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

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

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

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

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

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

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

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

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

§ 14 Definitions

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

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

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

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

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

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

§ 16 Modifications to this bond are as follows:

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

CONTRACTOR AS PRINCIPAL

Company: _____
(Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____

SURETY

Company: _____
(Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____



AIA[®]

Document A312[®] – 2010

Payment Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

CONSTRUCTION CONTRACT

Date:

Amount: \$

Description:

(Name and location)

BOND

Date:

(Not earlier than Construction Contract Date)

Amount: \$

Modifications to this Bond: None See Section 18

CONTRACTOR AS PRINCIPAL

Company: *(Corporate Seal)*

SURETY

Company: *(Corporate Seal)*

Signature: _____

Name and

Title:

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

Signature: _____

Name and

Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

§ 16 Definitions

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

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

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

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

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

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

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

§ 18 Modifications to this bond are as follows:

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

CONTRACTOR AS PRINCIPAL

SURETY

Company: _____ *(Corporate Seal)*

Company: _____ *(Corporate Seal)*

Signature: _____
Name and Title: _____
Address: _____

Signature: _____
Name and Title: _____
Address: _____

GENERAL CONDITIONS
of the
CONTRACT for CONSTRUCTION

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GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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

ARTICLE 1 DEFINITIONS

- A. "Addendum" or "Addenda" refers to revised Drawings and/or written requirements for the capital improvement work issued by the Architect prior to the time indicated for submission of a bid by a contractor.
- B. The "Architect" is the design professional engaged by the School District respecting the capital improvement projects to be performed in the School District.
- C. "Board" refers to the Board of the School District.
- D. "Central Administration" refers to the Superintendent of Schools or designee.
- E. The "Construction Manager" is the entity engaged by the School District to act as its representative during the course of construction of the Project.
- F. The "Contract Documents" are the Agreement between the Owner and the Contractor, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda which have been issued.
- G. The "Contractor" refers to the entity engaged by the School District to perform all or a part of the capital improvement project on its behalf.
- H. Where a contractor other than the General Contractor is the only contractor engaged to perform work, the responsibilities allocated to the General Contractor in these General Conditions shall be performed by such other contractor.
- I. The "Drawings" are the plans, elevations, sections, details, schedules, and diagrams developed by the Architect for the capital improvement projects to be performed in accordance with the Project manual of which these General Conditions of the Contract for Construction ("General Conditions") form a part.
- J. The "Project" refers to the entire capital improvement project to be performed in accordance with the Project Manual.

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

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

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

N. Accepted," "directed," "permitted," "requested," "required," and "selected" mean, unless otherwise explained, "accepted by the Architect and/or the Owner" "directed by the Architect and/or the Owner," "permitted by the Architect and/or the Owner," "requested by the Architect and/or the Owner," "required by the Architect and/or the Owner," and "selected by the Architect and/or the Owner." However, no such implied meaning will be interpreted to extend the Architect's or the Owner's responsibility into the Contractor's area of construction supervision.

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

P. "Furnish" means: (1) supply and deliver to the Project or other designated location, ready for unloading, unpacking, storing, assembly, installation, application, erection, or other form of incorporation into the Project, and ready for use; and (2) supply and deliver products requiring additional or supplemental fitting, assembly, fabrication, or incorporation into other elements of the Project directly to the fabricator, installer, or manufacturer as required.

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

R. "Provide" means furnish and install.

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

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

ARTICLE 2 CONTRACTOR'S REPRESENTATIONS

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

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

2. The Contractor represents and warrants that it has carefully studied and compared the Drawings and pertinent provisions of the Project Manual and that any errors, omissions, ambiguities, discrepancies, or conflicts found in said documents have been brought to the attention of the Architect for clarification prior to the Contractor's submission of its bid. If, in the interpretation of Contract Documents, requirements within the Drawings and Specifications conflict, or it appears that the Drawings and Specifications are not in the Agreement, the requirement to be followed shall be decided by the Architect. Where there is a discrepancy in quantity, the Contractor shall provide the greater quantity; where there is a discrepancy in quality, the Contractor shall provide the superior quality. Addenda supersede the provisions that they amend.

3. Each 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 and/or levels at various times. This "phasing," "out of sequence," or "come back" work shall be done at no cost to other contractors, the Owner, the Architect, or the Construction Manager.

B. The Contractor warrants to the Owner that: (1) the materials and equipment furnished under its contract will be of good quality and new, and of recent manufacture, unless otherwise required or permitted by the Contract Documents; (2) that its work will be free from defects not inherent in the quality required or permitted; and (3) that its work will conform with the terms

and conditions of the Agreement with the Owner. Work not conforming to these requirements, including substitutions not properly approved and authorized, shall be considered defective and shall be removed and replaced at the Contractor's cost and expense. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

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

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

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

3. The Drawings and the Specifications for the Contract have been prepared with care and are intended to show as clearly as is practicable the work required to be done. Work under all items in the Contract Documents must be carried out to meet field conditions to the satisfaction of the Architect and the Owner and in accordance with his instructions and the Drawings and the Specifications.

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

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

ARTICLE 3 CONTRACTOR'S CONSTRUCTION PROCEDURES

A.

1. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures required for the proper execution of its work on the Project. Where the Drawings, the Specifications, and/or the Project Manual make reference to particular construction means, methods, techniques, sequences or procedures or indicate or imply that such are to be used in connection with the Contractor's work, such reference is intended only to indicate that the Contractor's work is to produce at least the quality

of the work implied by the operations described, but the actual determination as to whether or not the described operations may be safely or suitably employed in the performance of the Contractor's work shall be the sole responsibility of the Contractor. All loss, damage, liability, or cost of correcting defective work arising from the employment of a specific construction means, method, technique, sequence, or procedure shall be borne solely by the Contractor.

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

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

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

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

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

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

temporary roads, and security personnel as deemed necessary by the Owner for the safety of the occupants of the site.

F.

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

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

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

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

G. The Contractor shall enforce strict discipline and good order among the Contractor's employees and its SubContractors' work forces and other persons carrying out the performance of its work. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them. The Owner reserves the right to object to any person to be hired or who is employed by the Contractor. Upon the request of the Owner, said person shall be removed from the Project and not again be assigned to perform the Contractor's work without the prior written permission of the Owner.

H. Within one (1) week after receiving notice of its award of the Contract, the Contractor shall employ a competent, full-time Project Manager and On Site Superintendent to be approved by the Owner or its representative, and such necessary assistants who shall be in attendance at each Project site whenever and wherever work is in progress to provide for the expeditious completion of the work. Said Project Manager and On Site Superintendent shall be employed until punch list and closeout of the Project. To the extent work is being performed contemporaneously at different facilities within the School District, the Contractor shall assign different superintendents for each facility at which work is being performed. The Project Manager and On Site Superintendent assigned by the Contractor shall not be changed except with the prior written consent of the Owner, unless the Project Manager or On Site superintendent or such assistant proves to be unsatisfactory to the Contractor and/or ceases to be in its employ. The Project Manager and On Site Superintendent shall represent the Contractor, and communications given to the Project

Manager or On Site Superintendent, whether verbal or written, shall be as binding as if given to the Contractor. Oral communications to the Superintendent(s) or his/her assistant(s) and/or Project Manager shall be confirmed in writing by the Owner or the Architect. The Contractor shall forward to the Owner a copy of the resumes for each of its superintendents, Project Managers, and their assistants. The Owner, the Construction Manager or the Architect shall have the right to have any supervisory or management staff removed from the Project with or without cause.

I. Each Contractor shall provide, or otherwise see that, the Project Manager, or On Site Superintendent Site Managers, and/or responsible workers of each contractor and major subcontractor are equipped with cellular phones and radios. Each contractor shall provide the Owner, the Construction Manager, and the Architect with the cellular telephone number for each phone and worker.

J. The Contractor's supervisory personnel, including superintendents and their assistants, shall be versed in the English language. In the event the Contractor's supervisory personnel, the superintendents, Project Managers, and/or their assistants are not versed in the English language, the Contractor shall employ the services of a full-time on-site interpreter to facilitate communications with such supervisory personnel, superintendents and/or assistants.

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

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

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

3. The name, address and telephone number of the bonding company, banking, and insurance company for the Prime Contractor including the name, address, and telephone number of each bonding company's primary contact representative for the Project.

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

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

L.

1. Tests, inspections, and approvals of portions of the Contractor's work required by the Drawings and/or the Specifications shall be made at an appropriate time. Unless otherwise provided, the Contractor shall consult with the Architect and the Construction Manager

concerning the need for testing and/or inspection of its work pursuant to the Contract Documents and, after consulting with the Architect and the Construction Manager, the Construction Manager shall advise the Owner to make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority. The Owner shall bear all costs associated with the tests, inspections or approvals required by the Drawings and/or the Specifications, except as set forth in subparagraph 3 hereof.

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

3. If the Architect, the Construction Manager, the Owner, or public authorities or governmental agencies having jurisdiction determine that portions of the Contractor's work require additional testing, inspection, or approval due to the Contractor's failure to perform its work in accordance with the requirements of the Contract Documents and/or all federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies of public authorities or governmental agencies having jurisdiction, the Architect and the Construction Manager will advise the Owner of the need for such additional inspections or tests and the Owner shall make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner. The Contractor shall bear the costs of such additional testing as provided in Article 14(B).

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

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

1. The Contractor shall not interfere with the erection, installation, or storage upon the premises of any work, materials, supplies, or equipment which is to be performed and

furnished by other contractors, and the Contractor shall properly connect and coordinate its work therewith.

2. The Contractor shall not commit or permit any act which will interfere with the performance of the work of any other Contractor performing work on the Project. If the Contractor sustains any damage through any act or omission of other contractors having a contract with the Owner for the performance of work upon the site or of work which may be necessary to be performed for the proper execution of the work to be performed hereunder, or through any act or omission of a SubContractor of such contractor, the Contractor shall promptly notify the Owner and the Construction Manager of such damage.

3. 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.

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

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

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

7. If part of the Contractor's work depends upon construction or operations by the Owner or another contractor, the Contractor shall, prior to proceeding with that portion of its work, promptly report to the Architect and the Construction Manager apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or other contractor's completed or partially completed construction is fit and proper to receive the Contractor's work.

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

O.

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

2. The Contractor shall pay any costs or fees incurred in such compliance and any fines or penalties imposed for violation thereof and any costs or fees incurred by the Owner due to such violation. If the Contractor observes that portions of the Contract Documents are at variance therewith, the Contractor shall promptly notify the Architect and the Owner in writing, and necessary changes shall be accomplished by appropriate modification to the Drawings and/or the Specifications.

3. If the Contractor performs Work knowing it to be contrary to all federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies of public authorities or governmental agencies without such notice to the Architect, the Construction Manager, and the Owner, the Contractor shall assume full responsibility for such Work and shall bear the attributable costs and shall bear the total cost for correction of same.

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

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

**ARTICLE 4
CONTRACTOR'S USE OF SITE**

A. The Contractor shall confine operations at the site to the areas at which construction is to be performed and to such areas permitted by law, ordinances, permits and as set forth in detail in the Project Manual and the Drawings, the Specifications, and the Project Manual.

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

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

D. General Safety and Security Standards for Construction Projects:

1. All construction materials shall be stored in a safe and secure manner.

2. Fences around construction supplies or debris shall be maintained.

3. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.

4. During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.

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

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

7. All disconnect and/or tie-in work involving any utilities that would interfere with the ongoing operations of the Owner shall be completed after hours when the facility is not in

use. The performance of this work shall be projected on all schedules required to be prepared by the Contractor. Additionally, the Contractor shall give the Construction Manager and the Owner at least forty-eight (48) hours advance written notice of its intention to perform this type of work. All overtime and standby personnel necessary to complete these tie-ins shall be the responsibility of the Contractor performing the work.

E.

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

- a. adequate ventilation;
- b. wetting down;
- c. keeping bags of insulating materials, cement, etc., closed and sealed;
- d. controlled mixing of materials under field conditions;
- e. special attention should be utilized in sawing of insulation and certain acoustical materials and storage of materials;
- f. job housekeeping must be maintained; and
- g. advising all personnel of hazardous conditions, including supervisors and workers.

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

2. A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs, or elevators designated for students or school staff.

3. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.

4. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety, and educational capabilities at all times that classes are in session.

F.

1. Storage space will be allotted to the Contractor by the Owner to the extent such space, in the sole discretion of the Owner, is available. The Contractor shall be responsible for securing appropriate space for its material with the Construction Manager prior to delivery. If insufficient space is available on the site, the Contractor shall provide local off-site storage, storage containers, etc. at its own cost and expense. Should any of the material stored on-site obstruct the progress of any portion of the work or the Project, this material shall be removed by the Contractor without reimbursement of cost, from place to place or from the premises, as the Construction Manager may direct.

2. The Contractor shall schedule delivery of materials and equipment to minimize long term storage at the Project, to prevent overcrowding of construction spaces, and to ensure that under no circumstances will materials that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses be stored on site.

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

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

5. A construction entrance will be designated for deliveries. A separate entrance will be established for entering and exiting the site only. All deliveries shall be scheduled and

coordinated with the Construction Manager and the Owner. Unexpected or uncoordinated deliveries may be turned away by the Owner or the Construction Manager at the discretion or necessity of the Owner. The Owner's enforcement of this provision shall not be construed by any contractor or subcontractor as the basis for a claim of delay in time or monetary damages alleged to have been incurred as a result of refusal of delivery.

6. The Contractor for General Construction shall provide necessary and required security measures to adequately safeguard the construction site from vandalism and intrusion of unauthorized persons. The Contractor for General Construction shall submit its means and methods of security to the Construction Manager for review and comment. The Project must be secured twenty-four (24) hours a day, seven (7) days a week including holidays. The General Construction Contractor's failure to secure the site as required by this paragraph will result in the Owner engaging the services of such necessary personnel so as to provide such security. No notice will be given the Contractor for General Construction of the Owner's intention to engage such security services and all costs and expenses associated with the Owner's security of the site in this regard will be back charged to the Contractor for General Construction. While the Owner may have security guards patrolling the Project, the function of such security guards is not for the purpose of specifically guarding the Contractor's property or operations of work.

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

H.

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

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

3. In the event the Contractor fails to complete all work under the Contract Documents by said scheduled dates, the Contractor will not be permitted to perform any work during normal school hours. Such work shall only be performed after school hours, Saturdays, Sundays, holidays, or periods when school is unoccupied at no additional cost of any kind to the Owner. In addition to damages incurred by the Owner in connection with the Contractor's delay, the Contractor shall be liable for all costs incurred by the Owner to provide staff and the

Architect's and the Construction Manager's personnel as required to make facility accessible by the Contractor and perform inspections during such off hours.

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

I. Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken.

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

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

L.

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

2. The Contractor shall ensure that its work, at all times, is performed in a manner that affords reasonable access to both vehicles and individuals, to the premises of the School District and all adjacent areas. The Contractor's work shall be performed, to the fullest extent possible, in such a manner that areas in and around the construction area shall be free from all debris, building materials and equipment likely to cause hazardous conditions, and do not close or obstruct walkways, roadways, pathways, or other occupied facilities or facilities to be used by the Owner. Without limitation to any other provision of the Agreement between the Contractor and the Owner, the Contractor shall use its best efforts to minimize any interference with the occupancy of areas, buildings, entrances, and parking areas in and around the premises at which work is being performed. Free access to fire hydrants and standpipe connections shall be

maintained at all times during construction operations, and portable fire extinguishers shall be provided by the Contractor and made conveniently available throughout the construction site.

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

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

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

M. No drinking of alcoholic beverages, smoking, or use of cannabis, cannabinoid hemp, personal vaporizing devices, or controlled substances is permitted on the grounds. The Contractor shall ensure that none of its or its SubContractors, their respective employees, agents, and/or consultants report to the site impaired by alcohol, cannabis/cannabinoid hemp, or controlled substances. The Contractor bears the responsibility of determining if its, or its SubContractors' employees are in any way impaired and whether the safety of the public, the employees of other Contractors and their SubContractors, the Owner, the Architect, or the Construction Manager are jeopardized. Each contractor shall provide drinking water for its own employees.

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

O. The Contractor's employees, representative, agents, and consultants, and all of its SubContractors' employees, representatives, agents, and consultants at the site are to wear shirts, long pants, and proper footwear.

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

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

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

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

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

U.

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

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

V.

1. The Contractor shall control the safe handling and storage of all welding materials, acetylene and oxygen tanks, and other equipment required for welding and cutting work at the job site. Such storage shall be in compliance with the Occupational Safety and Health Administration (“OSHA”) regulations.

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

A.

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

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

3. If the Owner, the Construction Manager, or the Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom

the Owner, the Construction Manager, and the Architect have no objection. No increase in the Contract Sum shall be allowed where a SubContractor is rejected by the Architect, the Construction Manager, or the 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; (3) has a history of poor performance in work of similar nature; or (4) does not otherwise meet the requirements of this General Conditions. Upon receipt of a rejection of a SubContractor by the Architect, the Contractor shall have the right to request a meeting with the Architect, the Construction Manager, and the Owner to discuss the reasons it believes the SubContractor is or is not qualified to perform the work. Upon review of such reasons, the Architect shall re-consider its determination and shall advise the Contractor of its determination upon such review. If the Architect still finds that such SubContractor does not meet the requirements above stated, it shall advise the Contractor. The Architect's determination upon such review shall be final and binding on the Contractor and its SubContractor and the Contractor hereby waives any and all claims it or its SubContractor might have against the Owner, the Construction Manager, and/or the Architect concerning the rejection of such Contractor and shall require its SubContractors to execute such similar waiver in its Agreement with the Contractor.

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

B. By appropriate Agreement, the Contractor shall require each SubContractor to be bound to the Contractor by terms of the Contractor's Agreement with the Owner, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by said Agreement, assumes toward the Owner and the Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, the Construction Manager, and the Architect under the Contractor's Agreement with the Owner so that subcontracting thereof will not prejudice such rights, and shall allow the SubContractor, unless specifically provided otherwise in the subcontract Agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by its Agreement with the Owner, has against the Owner. However, the Subcontract Agreement between the Contractor and SubContractor shall not provide, nor shall this Agreement be deemed to provide any rights, remedies or redress by the SubContractor(s) against the Owner. Where appropriate, the Contractor shall require each subcontractor to enter into similar agreements with Sub-SubContractors.

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

D. The Contractor hereby assigns all of its rights in its Agreements with its SubContractor(s) and hereby does assign, transfer, and set over to the Owner all of its rights and/or interests in its Agreements with its SubContractor(s), but only in the event of termination of the Contractor's Agreement with the Owner pursuant to Article 17, paragraph A of these General Conditions and only to the extent the Owner implements its rights to take such assignment of contract by

notifying the SubContractor in writing of its intention to do so. Such an assignment is subject to the prior rights of the surety, if any, obligated to the Owner pursuant to a performance bond submitted in connection with the Contractor's work.

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

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

G. All subcontracts must be in writing.

ARTICLE 6 CONTRACTOR'S USE OF DRAWINGS/SPECIFICATIONS

A. The Agreement between the Owner and the Contractor, and all documents incorporated therein by reference, including but not limited to, the Drawings and the Project Manual shall be signed by the Contractor and the Owner.

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

C.

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

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

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

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

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

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

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

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

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

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

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

All copies of them, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the Work.

I. The Drawings, the Specifications, and other documents prepared by the Architect, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any SubContractor, Sub-SubContractor or material or equipment supplier on other Projects without the specific prior written consent of the Owner and the Architect. The Contractor, SubContractors, Sub-SubContractors and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Drawings, the Specifications, and other documents prepared by the Architect appropriate to and for use in the performance of its work pursuant to its Agreement with the Owner. All copies made under this license shall bear the statutory copyright notice, if any, shown on the Drawings, the Specifications, and other documents prepared by the Architect. 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 copyright or other reserved rights.

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

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

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

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

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

O.

1. The General Construction Contractor shall establish a baseline and benchmark system for each building addition, area of renovation or component using the services of a licensed professional surveyor. The surveyor(s) employed to establish this system or to extend and maintain an existing benchmark system for the work of other trades shall have not less than five (5) years of experience in performing construction surveys similar to the work they will perform for the Project. The remaining contractors and their respective subcontractors shall be responsible for extending these lines, levels, and grades, and for performing all layout for their own work. The Contractor is solely responsible for any damage or loss due to incorrect extension of lines, level, or grades in their layout. The Contractor and its SubContractors shall be responsible for the accuracy with respect to the layout of their work. Any discrepancies or errors in the Drawings, perceived by another contractor or subcontractor shall be immediately reported to the Construction Manager. If any corrections are necessary, they shall be executed in accordance with the terms and provisions of these General Conditions.

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

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

4. Each contractor is responsible for the accuracy of his own work.

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

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

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

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

T.

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

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

U. The Contractor shall, prior to the start of any portion of the Work:

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

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

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

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

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

V.

1. To the fullest extent possible, the Contractor shall provide products of the same kind, from a single source. When two or more items of same material or equipment are required (pumps, valves, air conditioning units, etc.), they shall be of the same manufacturer. Product

manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in the work, except as otherwise indicated. The Contractor shall provide products which are compatible within systems and other connected items. If the Contractor is given option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

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

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

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

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

X.

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

- a. For which specified material or equipment the request for substitution is being made.
- b. What kind, type, brand, or manufacturer is sought to be substituted for the specified items.
- c. Written documentation evidencing that the substituted material or equipment meets or exceeds the Specifications for materials and/or equipment set forth in the Project Manual. Such documentation shall include, but not limited to, a full explanation of the proposed substitution, together with a submittal of all supporting data including technical information, catalog cuts, warranties, test results, installation instructions,

operating procedures, significant qualities of proposed substitution (*e.g.*, performance, weight, size, durability and visual effects), and other like information necessary for a complete evaluation of the substitution. Additionally, the Contractor shall provide material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated. All such data shall be provided to the Architect and the Owner at the Contractor's sole expense. The Contractor's written explanation shall also include a list of reasons the substitution is advantageous and necessary, including the benefits to the Owner and the Project in the event the substitution is acceptable. Additionally, the Contractor shall submit to the Architect information describing in specific detail how the proposed substituted product differs from the quality and performance required by the Specifications, and such other information as may be required by the Owner or the Architect.

- d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors that will be necessary to accommodate proposed substitution.
- e. Samples, where applicable or requested.
- f. Detailed comparison of the Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
- g. Detailed comparison of the difference in cost between the specified product and the proposed substitution, including any and all costs associated with changes or modifications needed to other parts of the work and to construction performed by the Owner and/or separate contractors that will be necessary to accommodate proposed substitution. In the event the substitution is accepted, the Contractor proposing the use of the substitution shall bear all costs associated with said changes or modifications.

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

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

- b. represents that the warranty for the substitution will be the same, or greater than, that applicable to the specified product;
- c. certifies that the cost data is complete and includes all related costs under this contract, including professional services necessary and/or required for the Architect/Engineer to implement said substitution and waives any and all claims for additional costs related to the substitution which subsequently become apparent;
- d. represents that it will coordinate the installation of the accepted substitute, making all such changes to the Drawings effected by the change, including but not limited to the electrical, plumbing, site work, and heating and ventilating specifications as may be required for the work to be complete in all respects;
- e. will provide an affidavit stating that: (1) the proposed substitution conforms and meets all the requirements of the pertinent specifications and the requirements shown on the Drawings; and (2) the Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect; and the proposed substitution will have no effect on the construction schedule.

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

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

Y.

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

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

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

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

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

6. The Architect shall review, approve, reject, or take other appropriate action respecting submittals made by the Contractor as set forth in the Project Manual. The Architect shall check for conformance with information given in the Drawings and Project Manual and the design concept expressed in the Agreement between the Owner and the Contractor. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities or for substantiating instructions for installation or performance of equipment or systems designed by the Contractor, all of which remain the responsibility of the Contractor. Further, the Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of construction means, methods, techniques, sequences, or procedures.

The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component. When professional certification of performance characteristics of materials, systems or equipment is required by the Contract Documents, the Architect shall be entitled to rely upon such certification to establish that the materials, systems, or equipment will meet the performance criteria required by the Contract Documents.

7. Upon the Architect's rejection of the Contractor's shop drawings, product data, samples, and/or other documentation submitted by the Contractor to the Architect, the Contractor shall review the rejection and re-submit such shop drawing, product data, sample and or other document in accordance with the Architect's instruction. The Contractor shall direct the Architect's specific attention in writing or on re-submitted shop drawings, product data, samples, or similar submittals, to revision which have been made, including revisions not specifically requested by the Architect. Resubmission of rejected documents shall be performed within two (2) calendar days. No claim for delay or cost shall be accepted as a result of rejected documents.

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

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

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

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

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

drawings receive the approval from the Architect and the Owner (and all other closeout requirements are met).

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

DD. Each Prime Contractor shall be furnished, free of charge, three (3) copies of the Contract Documents and Project Manuals, including all Addenda. Any and all additional copies will be furnished to the Contractor at the cost of reproduction, postage, and handling.

ARTICLE 7 CONTRACTOR'S SAFETY/SECURITY PROGRAM

A.

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

2. Where applicable, the Contractor shall provide its 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 Personal Protective Equipment ("PPE") by each person on site working with or for the Contractor. The Contractor shall strictly follow and ensure that its SubContractors follow Contractor's COVID-19 Safety Plan, as well as all applicable Center for Disease Control guidelines and Local, State & Federal Orders.

3. All laborers, workers, and mechanics employed in the performance of the work of the Project shall be certified as having successfully completed a course in construction safety and

health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration.

4. The Contractor and its SubContractors shall conduct their operation in accordance with the Safety Guides for Construction as issued by the New York State Education Department ("NYSED"), and the Contractors' Safety Program.

5. All safety equipment, including hard hats and weather protective gear required for the Contractor to perform its work, are to be supplied by the Contractor and/or its SubContractors. Within the designated construction areas, the Contractor's employees, superintendents, and/or other agents, and its SubContractors, employees, superintendents, and/or other agents are required to wear hard hats and other required and/or essential safety equipment. Each person seen without a hard hat, or otherwise failing to comply with this requirement, will be ordered to leave the Project. No prior warnings will be given by the Owner, the Construction Manager, and/or the 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.

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

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

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

B. The Contractor shall schedule weekly safety meetings and each of its SubContractors must be properly represented at such meetings. The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. The Contractor shall notify the Construction Manager in writing of its "OSHA Competent Person Regarding Safety." Said person must be an individual capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. This person shall be the Contractor's Superintendent, unless otherwise designated by the Contractor in writing to the Construction Manager and the Architect. The Contractor shall take all necessary steps to prevent its employees from disturbing and/or damaging the facility and shall be responsible for preventing the escape of fires set in connection

with the construction. The Contractor shall notify its employees and its SubContractors of the location of the nearest fire alarm box at all locations where the work is in progress. On a weekly basis, the Contractor shall submit to the Construction Manager and the Architect minutes of its safety meetings, which minutes shall include a list of the individuals present at such meetings.

C. The Contractor and each of its SubContractors shall conduct its/their operation in accordance with all applicable federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies. The Contractor agrees, in order that the work will be completed with the greatest degree of safety to conform to the requirements of the Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, including all standards and regulations that have been since or shall be promulgated by the governmental authorities which administer such acts.

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

E. The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for surety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.

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

G. The Contractor shall protect and secure its work and the materials and/or equipment to be utilized in connection with its work, whether stored on or off the site and whether in its care, custody and control or that of its SubContractors, subcontractors to its subcontractors, or material suppliers.

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

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

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

Manager and the Owner in writing prior to the use of same to ensure the safety of building occupants.

K. The Owner or the Construction Manager reserves the right to have all hoisting equipment periodically inspected by an independent inspector whose findings will be binding. The Contractor, at its own expense, must make corrections cited by the inspector before continuing work. The Owner or the Construction Manager will not assume any responsibility for the safe operation of any hoisting equipment by exercising this right. The Contractor and/or its SubContractor(s) shall cooperate with the inspector by allowing time for the inspection. The Contractor shall be notified twenty-four (24) hours prior to the time of the inspection. These inspections do not release the Contractor of its responsibility to provide all engineering, permits and inspections as required by OSHA or the NYSED prior to use of any hoisting equipment.

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

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

N.

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

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

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

4. The Contractor is responsible for its own storage and personnel trailers at the site. The Contractor will be required to supply man trailers and storage box trailers as required. All costs related to delivery, construction, protection, power, etc. for said trailers are the

responsibility of the Contractor utilizing the space. The Owner WILL NOT PROVIDE STORAGE SPACE. The placement of personnel and/or storage trailer will be strictly limited to pre-determined locations. The Contractor shall obtain the prior written approval of the placement of any trailer or storage box from the Construction Manager.

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

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

Q.

1. The Contractor shall promptly remedy damage and loss to all property of the Owner, or adjacent to the Owner's property (other than damage or loss covered by insurance) caused in whole or in part by the Contractor, a SubContractor, a Sub-SubContractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable, except damage or loss attributable to acts or omissions of the Owner or the Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor.

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

R. The Contractor shall promptly report in writing to the Owner, the Architect, and the Construction Manager all accidents arising out of or in connection with the Work which cause death, person injury, or property damage, giving full details and statements or any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident

shall be reported immediately by telephone or messenger to the Owner, the Construction Manager, and the Architect.

S. In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss.

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

U. 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, and to the extent permitted by law, the Contractor is solely responsible for compliance with all such federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies imposed for the protection of persons performing the Contract.

V. The Construction Manager, the Owner, and/or the Architect will not assume any responsibility for the safe operation of any cranes or equipment. The Contractor and its SubContractors shall cooperate with the inspector by allowing time for inspection. The Contractor will be notified twenty-four (24) hours prior to the time of the actual inspection. The Contractor is obligated to perform all engineering, obtain all permits (except as otherwise noted in Article 6(Q), and to have all hoisting equipment inspected as required by OSHA, Village, Town, County, State, and Federal regulations as well as any other agency having jurisdiction. Copies of all inspection reports and certificates must be transmitted to the Construction Manager as soon as possible.

ARTICLE 8 CHANGES IN THE WORK

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

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

engaged by the Owner in connection with the Project. All field orders shall be given to the Contractor and the Construction Manager by the Architect in writing.

C.

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

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

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

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

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

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

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

5.

- a. A change in the Contract Sum shall be accomplished only by a written Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim as defined in Article 18 of these General Conditions to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents. **No amount shall be payable by the Owner to the Contractor for performance of work without a written and fully executed Change Order.**
- b. Upon the Contractor's completion of the Change Order work, and prior to payment being made to the Contractor for such work, the Contractor shall provide the Owner with the following information:
 - (1) Certified payrolls itemizing the labor actually utilized in connection with the change order work.
 - (2) Copies of invoices from SubContractors supplying work in connection with the change order work.

D.

1. When the Owner or the Architect request that portions of the Contractor's work originally included in the Drawings or the Specifications be deleted and which will result in a reduction of the Contractor's original contract sum, the Architect shall request that the Contractor submit its proposal for deleting the scope of such work from its contract. The Contractor's proposal shall include a complete itemization of the costs associated with deducting such work including labor and materials and shall be submitted using the format set forth in Article 8,

paragraph C(1) or the schedule of values, whichever is greater. The Contractor shall not be entitled to retain its overhead and/or profit for such work nor shall any of its SubContractors which were to perform the work being deducted from the Contractor's scope of work. Additionally, the Contractor shall reflect the reduced cost of premiums on bonds which are to be supplied herein as a result of such change. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase/decrease with respect to that change.

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

E.

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

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

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

ARTICLE 9 PAYMENTS

A.

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

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

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

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

B. The Contractor shall include in its contract sum all allowances stated in the Specifications. However, the Contractor's costs for unloading and handling at the site, overhead, profit, and

other expenses contemplated for the stated allowance amounts shall be included in its contract sum and not in the allowances.

C. The Contractor shall submit its applications for payment to the Construction Manager and the Architect on a periodic basis. The form to be used by the Contractor shall be AIA G732 and 703/CMA approved by the Construction Manager, the Architect, and the Owner for use in connection with the Contractor's work. The form shall be divided in sufficiently in the same form as the Contractor's schedule of values and shall reflect in separate line items for the work:

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

D.

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

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

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

- b. the filing of third-party claims or reasonable evidence that there is a probability that such claims will be filed;
- c. receipt by the Owner of a notice of withholding from the New York State Department of Labor or other administrative agencies having jurisdiction over the Project;
- d. the Contractor's failure to make proper payments to its SubContractors or material suppliers for labor, materials and/or equipment;
- e. reasonable evidence that the Contractor will not complete its work for the unpaid balance of the remaining monies on its contract;
- f. damages caused to the Owner, the Construction Manager, the Architect or another contractor as a result of the Contractor's performance of its work;
- g. reasonable evidence that the Contractor will not complete its work in accordance with its Agreement with the Owner, and/or that the remaining monies available on the Contractor's contract will not be sufficient to cover actual or liquidated damages for the anticipated delay;
- h. the Contractor's failure to carry out its work in accordance with the Drawings and/or the Specifications;
- i. the Contractor's failure to notify the Architect of errors or inconsistencies between and among the Drawings and the Specifications;
- j. the Contractor's and/or its SubContractors' failure to comply with the requirements for maintaining record drawings;
- k. the Architect's and/or the Construction Manager's discovery or observation of work which has been previously paid for by the Owner which is defective and/or incomplete;
- l. such other acts and/or omissions by the Contractor in connection with the performance of its work;
- m. the amount requested exceeds the percent completion of work on the site.

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

- a. A current Contractor's lien waiver and duly executed and acknowledged sworn statement showing all SubContractors and material suppliers with whom the Contractor has entered into subcontracts, the amount of each such subcontract, the amount requested for any SubContractor and material suppliers in the requested progress payment and the amount to be paid to the Contractor from such progress payment, together with similar sworn statements from all such SubContractors and material suppliers;
- b. Duly executed waivers of public improvement liens from all SubContractors and material suppliers and lower tiered SubContractors or material suppliers establishing payment or satisfaction of payment of all amounts requested by the Contractor on behalf of such entities or persons in any previous application for payment; and AIA Form G706 or G706A.
- c. Certified payroll for employees of the Contractor and employees of SubContractors performing work on the Project.
- d. Copies of invoices submitted to the Contractor by its SubContractors and/or material suppliers.
- e. Such other information which the Owner, the Construction Manager and/or the Architect request the Contractor furnish in connection with its application for payment, including but not limited to, Contractor change order log, Contractor submittal log and as built drawings to date.

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

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

6. The Owner shall make payment to the Contractor within forty-five (45) days of receipt of the Contractor's requisition of payment unless such requisition of payment is not in accordance with the terms of the Construction Documents.

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

8.
 - a. In the event a subcontractor and/or material supplier files with the Owner a public improvement lien, the Owner shall withhold payment on previously certified applications for payment which have not yet been paid or subsequent applications for payment submitted by the Contractor an amount equal to one hundred fifty percent (150%) of the amount set forth in such public improvement lien. This provision is in addition to and does not supersede the indemnity provisions set forth in Article 12 of these General Conditions.
 - b. The Owner may release any payment withheld due to the filing of a public improvement lien if the Contractor obtains security acceptable to the Owner or a lien bond which is: (1) issued by a surety acceptable to the Owner; (2) in form and substance satisfactory to the Owner; and (3) in an amount not less the one hundred fifty percent (150%) of such lien claim. The cost of the premiums for any such bond posted shall be borne solely by the Contractor. By posting a lien bond or other acceptable security, however, the Contractor shall not be relieved of its obligations pursuant to these General Conditions, including but not limited to the indemnity provisions set forth in Article 12 of these General Conditions.

E.

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

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

- a. Type of material must be specifically identified by the Contractor;
- b. The Contractor must furnish an invoice from its supplier showing the total value of material and/or equipment being stored off site and must provide the bill of lading for such material and/or equipment;
- c. The Contractor must provide a Certificate of Insurance in a form approved by the Owner for the full value of the item plus ten percent (10%).
- d. The Contractor must execute a security agreement, together with an executed UCC-1 form;

- e. The materials must be stored in a bonded warehouse;
- f. The Contractor must furnish a bill of sale for stored material and/or equipment;
- g. The Contractor still has liability for all materials whether paid or not until installed.

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

4. Prior to payment by the Owner, the Contractor may be required to provide the Architect and the Construction Manager with an opportunity to visually inspect the materials and/or equipment for the purpose of determining that such materials are in fact in storage, are the materials specified for the Contractor's work and for any other purpose which the Owner, Construction Manager, and/or the Architect deem necessary for payment to be made to the Contractor.

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

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

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

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

This information shall be itemized in the format shown below:

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

**ARTICLE 10
INSURANCE REQUIREMENTS**

A. Within ten (10) days of the award of the bid, the Contractor, at its sole cost and expense, shall provide the Owner with the following insurance coverage whether the operations to be covered thereby are through the Contractor or by a SubContractor, or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

The insurance required to be procured pursuant to this Article shall be purchased from and maintained by an insurance carrier licensed and admitted to do business in the State of New York, with an AM Best rating of A-, VIII, or better. The Contractor must submit the Certificate of Insurance to the Construction Manager for the Owner's approval prior to the commencement of any work. EXCESS OR SURPLUS LINE INSURANCE CARRIERS WILL NOT BE ACCEPTED.

1. **Workers' Compensation, Paid Family Leave and NYS Disability Insurance**
Statutory Workers' Compensation (C-105.2 or U-26.3), NYS Paid Leave 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.

2. **Commercial General Liability Insurance**
\$1,000,000 per Occurrence/\$2,000,000 aggregate with coverage for sexual misconduct
\$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.

3. **Owners Contractors Protective (OCP) Insurance:**
For Projects less than or equal to \$1,000,000 and work on 1 story (10 feet) only:
\$1,000,000 per occurrence, \$2,000,000 aggregate with the Owner as the named insured.

For Projects greater than \$1,000,000 and/or work above one story (10 feet):
\$2,000,000 per occurrence, \$4,000,000 aggregate with the Owner as the named insured.

The Owner will be the named insured on OCP Policies. There will be no additional insureds on any OCP Policies.

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

5. **Umbrella/Excess Insurance**
\$5,000,000 each occurrence and aggregate for general construction (including plumbing, electrical, and HVAC) and no work at elevation (<1 story or 10 feet) or Project values less than or equal to \$1,000,000.

\$10,000,000 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 or provide broader coverage over the General Liability and Automobile Liability coverages.

6. **Asbestos/Lead Abatement/Pollution Liability Insurance**
If the Project requires the removal of asbestos and/or hazardous materials, the Contractor shall provide hazardous material liability insurance as follows:

\$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 provide pollution liability broadened coverage (ISO endorsement CA 9948 or CA 01 12), as well as proof of MCS 90. Coverage shall fulfill all requirements of this Article 10 and shall extend for a period of three (3) years following acceptance by the Owner of the Certificate of Completion.

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

B. Notwithstanding any terms, conditions, or provisions, in any other writing between the parties, the Contractor hereby agrees to effectuate the naming of the Owner, the Architect, and the Construction Manager as an additional insured on the Contractor's Commercial General Liability and Excess/Umbrella insurance policies.

1. The policies naming the Owner, the Architect, and the Construction Manager as named insured or additional insured, as applicable, shall:

- a. be an insurance policy from an A.M. Best A- rated insurer, licensed and admitted to conduct business in New York State; and
- b. state that the coverage shall be primary and non-contributory coverage for the Owner, its Board, employees, and volunteers with a waiver of subrogation in favor of the Owner for all coverages including Workers Compensation.

2. Additional insured status for General Liability coverage shall be provided by standard or other endorsements that extend coverage to the Owner for on-going operations (CG 20 38 or equivalent) and products and completed operations (CG 20 37 or equivalent). The decision to accept an alternative endorsement rests solely with the Owner. A completed copy of the endorsement must be attached to the certificate of insurance to include General Liability, Automobile Liability and Umbrella/Excess coverages.

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

4. At the Owner's request, the Contractor shall provide a copy of the declaration page of the liability and excess policies with a list of endorsements and forms. If so requested, the Contractor will provide a copy of the policy endorsements and forms.

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

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

7. The Contractor agrees to indemnify the Owner, the Architect and the Construction Manager for any applicable deductibles and/or self-insured retentions.

If written on a "claims-made" basis, the retroactive date must pre-date the inception of the Agreement. Coverage shall remain in effect for three (3) years following the completion of work. The Contractor shall also provide proof of Workers' Compensation and New York State Disability Benefits Insurance, Commercial General Liability and Excess Liability with limits of \$2,000,000 each occurrence and in the aggregate.

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

D. The Contractor will be permitted to commence work on the Project with the insurance certificates currently on file with the Owner. On or before July 15 of each year, the Contractor will substitute said insurance certificates with insurance in strict compliance with Article 10. In addition to any other rights or remedies that the Owner may have in law, equity or pursuant to the General Conditions of Construction set forth in the Agreement between the Owner and the Contractor, in the event the Contractor fails to provide evidence of the insurance required by Article 10 by July 15, the Owner shall assess liquidated damages of \$1,000.00 for every day the Contractor fails to meet the requirements for insurance as set forth in Article 10 through final completion of the Project or the date the required insurance is submitted, whichever is earlier.

E. All insurance coverage to be provided by the Contractor, pursuant to paragraph A of this Article 10, shall include a cancellation notice to the Owner pursuant to the policy terms and conditions. All insurance coverage to be provided by the Contractor shall name the Owner, the Architect, and the Construction Manager as additional insureds on the policy, with the exception of Owners Contractors Policies. Additionally, the insurance coverage to be provided by the Contractor, pursuant to paragraph A of this Article 10, shall state that the Contractor's coverage shall be the primary and non-contributory coverage for the Contractor's work. A fully completed New York Construction Certificate of Liability Insurance Addendum (ACCORD 855 2014/15) must be included with the certificates of insurance. For any "Yes" answers on Items A through L on this Form -- additional details must be provided in writing. Policy exclusions may not be accepted.

F. The Contractor acknowledges that its failure to obtain or keep current the insurance coverage required by paragraph A of this Article 10 shall constitute a material breach of Contract and subjects the Contractor to liability for damages, including but not limited to direct, indirect, consequential, special, and such other damages the Owner sustains as a result of such breach. In addition, the Contractor shall be responsible for the indemnification to the Owner, the Architect, and the Construction Manager, of any and all costs associated with such lapse in coverage, including but not limited to reasonable attorney's fees.

G. In the event that any of the insurance coverage to be provided by the Contractor to the Owner contains a deductible, or a self-insured retention, or the insurance provided by the Owner contains a deductible, the Contractor shall indemnify and hold the Owner and the Architect harmless from the payment of such deductible or self-insured retention, which deductible shall in all circumstances remain the sole obligation and expense of the Contractor. The failure of the Owner, Construction Manager or Architect to object to the contents of the certificate or the absence of same shall not be deemed a waiver of any rights held by the Owner.

H. SubContractors are subject to the same terms and conditions as stated above and must submit same to the Owner for approval prior to the start of any work. In the event the Contractor fails to obtain the required certificates of insurance from the SubContractor and a claim is made or suffered, the Contractor shall defend, indemnify, defend, and hold harmless the Owner, Construction Manager, the Architect, Engineers, Consultants, and Sub-consultants and their officers, members of the Board, 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.

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

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

K. The Owner and the Contractor waive all rights against each other and any of their SubContractors, Sub-SubContractors, agents, and employees for damages caused by fire or other perils to the extent of actual recovery of any insurance proceeds under any property insurance policy procured, pursuant to paragraph A of this Article 10, or other property insurance applicable to the Contractor's work.

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

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

ARTICLE 11 REQUIRED BONDS FOR THE PROJECT

A. Within ten (10) days of the award of the bid, the Contractor shall furnish a Performance Bond, Labor and Material Payment Bond and Maintenance Bond (to be in effect during the warranty period) meeting all statutory requirements of the State of New York.

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

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

D. Bonds shall be executed by a responsible surety licensed to do business in New York with an A.M. Best Rating of "A-" or better as to Policy Holder Ratings, and "VIII" or better as to

“Financial Size Category.” Such bonds shall remain in effect for a period not less than three (3) years following final completion of the work by the Contractor.

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

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

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

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

I. A rider including the following provisions shall be attached to each Bond:

1. Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change, or other modification of the Contract Documents. Such addition, alteration, change, extension of time, or other modification of the Contract Documents, or a forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety of its obligations hereunder and notice to the Surety of such matters is hereby waived.

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

3. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within three (3) years after termination by the Owner of the Contractor’s contract or within three years after final completion by the Contractor. In the event the Contractor files for bankruptcy, the commencement of the three-year period shall not start to run until the bankruptcy proceeding is finalized or the Owner obtains relief from an automatic stay, whichever is later.

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

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

L. If the surety on any bond furnished by 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.

ARTICLE 12 INDEMNIFICATION

A. The Contractor and its SubContractors shall defend, indemnify and hold harmless: (1) the Owner, its consultants, employees, officers, members of the Board of Education, and agents; (2) the Architect and its consultants, employees, officers and agents; and (3) the Construction Manager, its consultants, employees, officers and agents from and against any and all claims, damages, losses, suits, obligations, fines, penalties, costs, charges and expenses, including but not limited to attorney's fees, which may be imposed upon or incurred by or asserted against any of them by reason of any act or omission of such contractor or any of its subcontractors or any person or firm directly or indirectly employed by such contractor, for the act(s) and/or omission(s) of any contractor or subcontractor in connection with the work of the Project.

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

limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a SubContractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

C. The Contractor and its SubContractors shall defend, indemnify and hold harmless: (1) the Owner, its consultants, employees, officers, members of the Board of Education, and its agents; (2) the Architect and its consultants, employees, officers, and agents; and (3) the Construction Manager, its consultants, employees, officers, and agents from and against any fines, penalties, judgments, or damages, including reasonable attorney's fees, imposed on or incurred by the parties indemnified hereunder which are incurred as a result of the Contractor's failure to give the notices required by Article 6(T) of these General Conditions of the Contract for Construction.

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

E. The Contractor and its SubContractors shall defend, indemnify and hold harmless: (1) the Owner, its consultants, employees, officers, members of the Board of Education, and agents; (2) the Architect and its consultants, employees, officers, and agents; and (3) the Construction Manager, its consultants, employees, officers, and agents from and against any and all liability for violation of all federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies applicable to the Contractor's work and shall defend any claims or actions which may be brought against the Owner as the result thereof.

F. The Contractor and its SubContractors shall defend, indemnify and hold harmless: (1) the Owner, its consultants, employees, officers, members of the Board of Education, and agents; (2) the Architect and its consultants, employees, officers, and agents; and (3) the Construction Manager, its consultants, employees, officers, and agents from and against any and all liability for claims made by third parties, including SubContractors, in connection with this Agreement and shall defend any claims or actions which may be brought against the Owner as the result thereof.

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

H. The indemnification obligations set forth herein shall become effective upon the Owner, the Architect or the Construction Manager's receipt of a claim for which the Contractor is required to provide indemnification to the Owner, the Architect, or the Construction Manager. In the event that the Contractor shall fail to refuse to defend any such action, the Contractor shall be liable to the Owner for all costs of the Owner in defending such claim or action and all costs of the Owner, including attorney's fees, in recovering such defense costs from the Contractor. In the event the Owner, the Architect, or the Construction Manager is required to bring an action to enforce the indemnification obligations set forth herein, the Contractor shall be liable to the Owner, the Architect, and/or the Construction Manager for all costs associated with said action including attorney's fees.

ARTICLE 13 TIME FOR COMPLETION OF WORK

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

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

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

D.

1. In the event the Owner determines that the performance of the Contractor's work, as of a milestone date, has not progressed or reached the level of completion required by its contract, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation: (1) working additional shifts or overtime; (2) supplying additional manpower, equipment, facilities; and/or (3) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the Contractor progresses its work in compliance with the stage of completion required by the Agreement with the Owner. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.

2. The Contractor shall not be entitled to an adjustment in its contract sum in connection with Extraordinary Measures ordered by the Owner under or pursuant to Paragraph D(1).

3. The Owner may exercise the rights furnished the Owner under or pursuant to Paragraph D(1) as frequently as the Owner deems necessary to ensure that the Contractor's performance of its work will comply with any Milestone Date or completion date set forth in the Contractor's Agreement with it.

4. The Owner reserves the right to withhold payment from the Contractor until such time as the Contractor submits a daily schedule showing work to be again on schedule with the Construction Schedule and/or until its work is being installed according to the Project construction schedule, without additional cost to the Owner.

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

F. Substantial completion shall be achieved by the Contractor when the Contractor has completed ninety-eight percent (98%) of its work. Work remaining to be completed after substantial completion shall be limited to items which can ordinarily be completed within the period between the payment at the time of substantial completion and final payment.

G.

1. The Project is to be physically completed in accordance with the time limits set forth in the Agreement between the Owner and the Contractor and as further set forth in the Project Manual and/or bidding documents. Liquidated damages will be assessed in the amount of One Thousand Two Hundred Fifty Dollars (\$1,250.00) for each and every calendar day after such time allowed for completion.

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

3. The said sum per calendar day shall constitute the Liquidated Damages incurred by the Owner for each day of delay beyond the agreed upon dates of substantial completion. Such Liquidated Damages shall be in addition to any other damages (other than by reason of delay) the Owner may incur as a result of the Contractor's breach of contract. In the event that substantial completion of its work is not achieved in accordance with the Project schedule, inspections will be performed once each week unless the Owner or the Architect determines, at their sole discretion, that additional inspections are not needed. All costs incurred by the Owner, the Construction Manager, and the Architect and the cost of additional inspections, at the rate of One Thousand Two Hundred Fifth Dollars (\$1,250.00) per inspection, will be subtracted from payment due the Contractor. If the amount due the Contractor for payment is insufficient, any deficiency shall be paid by the Contractor to the Owner.

H.

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

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

For each day of delay in the completion of its work, the Contractor shall be allowed one day of additional time to complete its contract.

The Contractor shall not be entitled to receive a separate extension of time for each one of several causes of delay operating concurrently; only the actual period of delay as determined by the Owner or its Architect may be allowed.

3. The Owner reserves the right to delay the commencement of Work or to otherwise modify the construction schedule set forth in the bid documents in order to comply with applicable federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies related to the COVID-19 pandemic. Contractor's remedies for any schedule modifications or delays caused directly or indirectly by the COVID-19 pandemic shall be an extension of time only, as further delineated in Article 13(H)(4), below.

4. Notwithstanding anything to the contrary in the Contract Documents, an extension in the contract time, to the extent permitted under this Article 13(H), shall be the sole remedy of the Contractor for any: (1) delay in the commencement, prosecution, or completion of the Work; (2) hindrance or obstruction in the performance of the Work; (3) loss of productivity or acceleration; (4) supply chain delays; or (5) other similar claims (collective referred to herein as "delay(s)"), unless a delay is caused by the Owner's active interference with the Contractor's performance of the Work, and only to the extent such acts continue after the Contractor furnishes the Owner with three (3) days' written notice of such interference. In no event shall the Contractor be entitled to any compensation or recovery of any damages in connection with any delay, including, but not limited to, consequential damages, lost opportunity costs, impact damages, or other similar remuneration. The Owner's exercise of any of its rights or remedies under the Contract Documents (including, but not limited to, ordering changes in the Work, or directing suspension, rescheduling or correction of the Work), regardless of the extent or frequency of the Owner's exercise of such rights or remedies, shall not be construed as active interference with the Contractor's performance of the Work.

ARTICLE 14 DEFICIENT AND INCOMPLETE WORK

A. The Owner, through the Architect or the Construction Manager, will have the authority to reject work performed by the Contractor which does not conform to the requirements of the Drawings and/or the Specifications.

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

C.

1. If a portion of the Contractor's work is covered contrary to the Architect's request or to requirements specifically expressed in the Drawings and/or the Specifications, upon request by the Architect or the Construction Manager, the Contractor shall uncover such work for the Architect's or any governmental authority's observation and be replaced at the Contractor's sole expense without change in the Contract Time or Contract Sum.

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

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

E. If the Contractor: (1) fails to correct work which is not in accordance with the requirements of its Agreement with the Owner; or (2) fails to carry out its work in accordance with the requirements of its Agreement with the Owner; or (3) fails or refuses to provide a sufficient amount of properly supervised and coordinated labor, materials, or equipment so as to be able to complete the work within the contract time; or (4) fails to remove and discharge (within ten (10) days) any lien filed upon the Owner's property by anyone claiming by, through, or under the Contractor; or (5) disregards the instructions of the Architect, the Owner or the Construction Manager, the Construction Manager, on behalf of the Owner may order the Contractor to stop its work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. This right shall be in addition to, and not in restriction of, other rights the Owner may have pursuant to these General Conditions or at law.

F.

1. If the Contractor defaults or neglects to carry out its work in accordance with its Agreement with the Owner and fails within a three (3) day period after receipt of written notice from the Construction Manager to commence and continue correction of such default or neglect

with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect, the Construction Manager and the Owner and such other consultants whose participation is deemed necessary by the Architect, for additional services and expenses made necessary by such default, neglect, or failure. Such action by the Construction Manager, including the amounts to be charged to the Contractor as a result of such action are subject to the prior approval of the Owner. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

2. Where the Contractor's default and/or neglect to carry out its work in accordance with its Agreement with the Owner threatens the health, safety and/or welfare of the occupants of the School District's facilities and/or threatens the structural integrity and/or preservation of the School District's facilities, the Owner may proceed to carry out the Contractor's work upon twenty-four (24) hours' notice of its intention to do so to the Contractor.

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

ARTICLE 15 FINAL COMPLETION AND CLOSEOUT OF THE PROJECT

A.

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

2. Upon determining that the Contractor's work has progressed to the point of Substantial Completion, the Architect shall prepare a punch list of the Contractor's work which shall include only minor items of work remaining to be performed by the Contractor to bring its work into compliance with the requirements of the Drawings and/or the Specifications. The Contractor shall proceed promptly to complete and correct items on the punch list issued by the Architect and shall complete said items within thirty (30) days of its receipt of the punch list from

the Architect. At the time of substantial completion, the Owner shall retain two hundred percent (200%) of the value of the punch list items from the Contractor's remaining contract sum. The value of said remaining work shall be determined by the Architect. Upon completion of the work reflected in the final punch list, the Owner shall release the monies withheld pursuant to this paragraph to the Contractor.

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

B.

1. If within three (3) years after the date of Substantial Completion of the Contractor's work or designated portion thereof, or after the date for commencement of warranties established pursuant to these General Conditions, or by terms of in applicable special warranty required by the Agreement between the Owner and the Contractor, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner, unless the Owner has previously given the Contractor a written acceptance of such condition. This period of three (3) years shall be extended with respect to portions of the Contractor's work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of such work. The obligation set forth hereunder shall survive acceptance by the Owner of the Contractor's and/or termination of the Contractor's Agreement with the Owner. The Owner shall give such notice within a reasonable period of time after discovery of the condition.

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

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

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

C. Upon receipt of written notice from the Construction Manager that the Contractor's work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Contractor's work acceptable pursuant to the terms and conditions of its Agreement with the Owner and the Contract fully performed and upon receipt of the closeout documentation required by the Contract Documents and elsewhere in the Agreement between the Owner and the Contractor, the Architect will certify to the Owner that the Contractor is entitled to final payment on the Project.

D.

1. Prior to receipt of final payment from the Owner, the Contractor shall provide to the Architect the close out documentation required by the Contract Documents.

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

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

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

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

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

ARTICLE 16 RELEVANT STATUTORY PROVISIONS

A. The Contractor shall at all times observe and comply with all federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies, 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 in addition to any other indemnification set forth herein, the Contractor shall indemnify and save harmless the Owner, and its officers, members of the Board, 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 its or by its employees or agents.

B. The Contractor and each of its SubContractors shall comply with prevailing wage rates as issued by the of New York State Department of Labor for the location and duration of the Project and shall comply with all requirements governing its payments to its employees as set forth in Labor Law, Section 220, *et seq.* of the New York State Labor Law.

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

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

1. No laborer, workman or mechanic in the employ of the Contractor, SubContractor or other person doing or contracting to do the whole or any part of the work contemplated by the Contract, shall be permitted or required to work more than eight (8) hours in any one calendar day or more than five (5) days in any one week, except in the emergencies set forth in the Labor Law.

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

3. The minimum hourly rate of wages to be paid shall not be less than that stated in the Project Manual, and any re-determination of the prevailing rate of wages after the Contract is approved shall be deemed to be incorporated herein by reference as of the effective date of re-determination and shall form a part of this Contract. The Labor Law provides that the Contract may be forfeited and no sum paid for any work done thereunder on a second conviction for willfully paying less than:

- a. the stipulated wage scale as provided in Labor Law, Section 220, Subdivision 3, as amended; or
- b. the stipulated minimum hourly wage scale as provided in Labor Law, Section 220-d, as amended.

E. The Contractor specifically agrees, as required by the provisions of the Labor Law of New York, Section 220-E, as amended that:

1. In the hiring of employees for the performance of this contract or any subcontractor hereunder, no contractor, subcontractor, nor any person acting on behalf of such contractor or sub-contractor shall by reason of race, creed, color, or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates.

2. No contractor, subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, color, creed, sex, or national origin.

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

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

F. The Contractor shall comply with all of the provisions of the Immigration Reform and Control Act of 1986 and regulations promulgated pursuant thereto and shall require its SubContractors to comply with same. In addition to the other indemnification obligations set forth herein, the Contractor shall and does hereby agree to defend, indemnify, and hold harmless the Owner, the Owner's agents, officers, members of the Board, and its employees from and against any penalties, fees, costs, liabilities, suits, claims, or expenses of any kind or nature, including reasonable attorney's fees, arising out of or resulting from any violation or alleged violation of the provisions of said laws in connection with the work performed hereunder.

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

H. The Contractor shall ensure that absolutely no asbestos containing material is used in conjunction with the performance of its work. The Contractor bears the sole responsibility to provide assurances that no asbestos containing material is built into the construction, or that any equipment used in the construction contains any asbestos containing material. If asbestos containing material is found, at any time during or after the construction is completed, it shall be the responsibility of the Contractor who installed said material to remove it and replace it with new non-asbestos containing material, as per federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies.

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

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

K. As set forth in Article 4(M), no smoking is allowed anywhere on school property per New York State and County law. Violators are subject to a \$1,000.00 fine and/or banishment from the property.

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

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

M. Wherever in the Specifications reference is made to ANSI or ASTM Standards, Federal Specifications, Consumer Product Standards, or similar recognized standards, the latest edition of the respective publishing agency in effect at the date of "Bid Issuance" shall be accepted as establishing the technical requirements for which compliance is required.

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

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

1. The Contractor and the Contractor's SubContractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that

employees are treated during employment without regard to their age, race, creed, color, national origin, sexual orientation, gender identity or expression, military status, sex, reproductive health decisions, disability, predisposing genetic characteristics, or material status. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

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

ARTICLE 17 TERMINATION OR SUSPENSION

A.

1. The Owner may terminate the Contractor's Agreement in the event the Contractor:
 - a. refuses or fails to supply sufficient skilled workers or suitable materials or equipment to complete the Work in a diligent, efficient, timely, workmanlike, skillful, and careful manner;
 - b. refuses or fails to correct deficient work performed by it;
 - c. fails to make prompt payments to SubContractors for labor, materials, and/or equipment in accordance with the respective agreements between the Contractor and the SubContractors;
 - d. disregards all federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies of public authorities or governmental agencies having jurisdiction;
 - e. disregards the instructions of the Architect, the Construction Manager or the Owner (when such instructions are based on the requirements of the Contract Documents);
 - f. is adjudged a bankrupt or insolvent, or makes a general assignment for the benefit of the Contractor's creditors, or a trustee or receiver is appointed for the Contractor or for any of its property, or files a petition to take advantage of any debtor's act or to reorganize under bankruptcy or similar laws; or

- g. breaches any warranty made by the Contractor under or pursuant to the Contract Documents.
- h. fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with all the requirements of the Contract Documents; or
- i. fails after commencement of the Work to proceed continuously with the construction and completion of the Work for more than ten (10) days, except as permitted under the Contract Documents.
- j. fails to keep the Project free from strikes, work stoppages, slowdowns, lockouts, or other disruptive activity;
- k. or otherwise does not fully comply with the Contract Documents.

2. When any of the above reasons exists, the Owner may, without prejudice to any other rights or remedies, terminate employment of the Contractor upon three (3) days' written notice and may, subject to any prior rights of the surety:

- a. take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- b. take possession of materials stored off site by the Contractor;
- c. take assignments of the Contractor's SubContractors in accordance with these General Conditions;
- d. finish the Work by whatever reasonable method the Owner may deem expedient.

3. When the Owner terminates the Contract for one of the reasons stated in Article 17(A)(1), the Contractor shall not be entitled to receive further payment until the completion of the Contractor's work. If the Owner's costs to complete the Contractor's work, including the expenses incurred by the Owner in connection with the services of the Architect, the Construction Manager and/or other consultants, exceed the contract balance remaining on the Contractor's contract, the Contractor shall be liable to the Owner for such excess costs. This provision shall survive termination of the Contractor's Agreement with the Owner.

B.

1. In addition to the Owner's right to carry out the work of the Contractor pursuant to the Agreement with the Contractor, the Owner may at any time, at will and without cause, terminate any part of the Contractor's work or all of the Contractor's remaining work for any reason whatsoever by giving three (3) days' written notice to the Contractor, specifying the portion of the Contractor's work to be terminated and the effective date of termination.

2. Upon receipt of a notice of termination for convenience, the Contractor shall immediately, in accordance with instructions from the Owner, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due it:

- a. Cease operation as specified in the notice.
- b. Place no further orders and enter into no further subcontracts for materials, labor, services, or facilities except as necessary to complete continued portions of the Contract.
- c. Terminate all subcontracts and orders to the extent they relate to the Work terminated.
- d. Proceed to complete the performance of the remaining work on its contract which has not been so terminated.
- e. Take actions that may be necessary, or that the Owner may direct, for the protection and preservation of the terminated Work.

3. The Contractor shall continue to prosecute that portion of its work which has not been terminated by the Owner pursuant to this paragraph. If the Contractor's work is terminated, the Owner shall not be liable to the Contractor by reason of such termination, except that the Contractor shall be entitled to payment for the work it has properly executed in accordance with the Agreement and prior to the effective date of termination (the basis for such payment shall be as provided in the Contract) and for costs directly related to work thereafter performed by the Contractor in terminating such Work, provided such work is authorized in advance by the Architect and the Owner in writing. No payment shall be made by the Owner, however, to the extent that such work is, was, or could have been terminated under the Contractor's Agreement with the Owner.

4. In case of a termination pursuant to this paragraph B, the Owner will issue a Construction Change Directive or authorize a Change Order, making any required adjustment to the Date of Substantial Completion and/or the sum of contract monies remaining to be paid to the Contractor. The Owner shall be credited for: (1) payments previously made to the Contractor for the terminated portion of the Work; (2) claims which the Owner has against the Contractor under the Contract; and (3) the value of the materials, supplies, equipment or other items that are to be disposed of by the Contractor that are part of the Contract Sum; multiplied by fifteen percent (15%) representing the Contractor's overhead and profit.

5. For the remaining portions of the Contractor's work which have not been terminated pursuant to this paragraph B, the terms and conditions of the Contractor's Agreement with the Owner shall remain in full force and effect.

6. Upon termination of the Contractor's work or a portion of the Contractor's work pursuant to this paragraph B, the Contractor shall recover as its sole remedy, payment for work which it has properly performed in connection with the terminated portion of the Work prior to the effective date of termination and for items properly and timely fabricated off the Project site, delivered and stored in accordance with the Owner's instructions. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, overhead and profit related to work terminated by the Owner pursuant to this paragraph B.

C.

1. In addition to the Owner's right to suspend, delay, or interrupt the Contractor from proceeding with any portion of its work pursuant to the terms and conditions of its Agreement with the Owner, the Owner may at any time, at will and without cause suspend, delay, or interrupt any part of the Contractor's work or all work for any reason whatsoever for such period of time as the Owner may determine by giving three (3) days' prior written notice to the Contractor, specifying that portion of the Contractor's work which is to be suspended, delayed, or interrupted, and the effective date of such suspension, delay, or interruption, as the case may be.

2. The Contractor shall continue to prosecute that portion of its work which has not been suspended, delayed, or interrupted, and shall properly protect and secure the portion of its work so suspended, delayed, or interrupted.

3. The Owner shall incur no liability to the Contractor 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 13 hereof.

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

ARTICLE 18 CLAIMS AND DISPUTES

A. Definition. A "Claim" is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other

disputes and matters in question between the Owner and the Contractor arising out of or relating to the Contract.

B. Time Limits on Claims. Claims by the Contractor must be made within thirty (30) days after occurrence of the event giving rise to such Claim, or within thirty (30) days after the claimant first recognizes the condition giving rise to the Claim, whichever is earlier. An additional Claim made after the initial Claim has been decided by the Owner will not be considered unless submitted in a timely manner. Failure of the Contractor to give timely notice of claim shall constitute waiver of the claim. Claims must be made by written notice to the Construction Manager, the Architect, and the Owner. The responsibility to substantiate Claims shall rest with the Contractor.

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

D. Claims for Concealed or Unknown Conditions. If conditions are encountered at the site which are: (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents; or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then written notice by the Contractor shall be given to the Owner and the Architect promptly before conditions are disturbed and in no event later than five (5) days after first observance of the conditions; and (3) in the case of a condition at the site which involves a hazardous or toxic substance, as those terms are defined by OSHA or AHERA, written notice to the Owner, the Construction Manager and the Architect shall be given immediately upon discovery of such hazardous or toxic substance. The Architect and/or the Construction Manager will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall so notify the Contractor in writing, stating the reasons.

E. Claims for Additional Cost. If the Contractor wishes to make a Claim for an increase in the Contract Sum as a result of a Change in the Work pursuant to Article 8 of these General Conditions, written notice as provided in this Article 18 shall be given before proceeding to execute the Work.

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

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

ARTICLE 19
MISCELLANEOUS PROVISIONS

A. The Agreement between the Owner and the Contractor shall be governed by the law of the place where the Project is located; venue to be in the County in which the Project is located.

B. Historical lack of enforcement of any federal, state, and local laws, ordinances, regulations, rules, codes, orders, and policies shall not constitute a waiver of Contractor's responsibility for compliance with such law in a manner consistent with its Agreement with the Owner unless and until the Contractor has received prior written consent for the waiver of such compliance from the Owner and the Agency responsible for the enforcement of such law.

C. All notices to be given hereunder shall be in writing and may be given, served, or made: (1) by depositing the same for first class mail delivery in the United States mail addressed to the authorized representative of the party to be notified; (2) by depositing the same in the United States mail addressed to the authorized representative of the party to be notified, postpaid and registered or certified with return receipt requested; (3) by depositing the same for overnight delivery (prepaid by or billed to the party giving notice) with the United States Postal Service or other nationally recognized overnight delivery service addressed to the authorized representative of the party to be notified; or (4) by delivering the same in person to the said authorized representative of such party. Notice deposited in the mail by certified mail or overnight delivery in accordance with the provisions hereof shall be effective from and after the fourth (4th) day next following the date postmarked on the envelope containing such notice, or when actually received, whichever is earlier. All notices to be given to the parties hereto shall be sent to or made at the addresses set forth hereinbelow. By giving the other parties at least seven (7) days' written notice thereof, the parties hereto shall have the right to change their respective addresses and specify as their respective addresses for the purposes hereof any other address in the United States of America.

D. Except as expressly provided in the Agreement between the Owner and the Contractor, duties and obligations imposed by such Agreement and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law, or in equity or by other Agreement, and such rights and remedies shall survive acceptance of the Contractor's work and/or any other termination of the Contractor's Agreement with the Owner.

E. No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

F. The headings denoting the separately numbered Articles of these General Conditions are specifically set forth for reference purposes only and are not in any way to be deemed explanatory of or limiting of the contents of any paragraph or subparagraph. Furthermore, said headings are

not to be deemed part of this Agreement for purposes of interpretation, litigation or as defining or limiting the rights or obligations of the parties.

G. In case any provision of this Agreement should be held to be contrary to, or invalid, under the law of any country, state or other jurisdiction, such illegality or invalidity, shall not affect in any way, any other provisions hereof, all of which shall continue, nevertheless, in full force and effect in any country, state, or jurisdiction in which such provision is legal and valid.

H. The rights stated in these General Conditions and the documents which form the Agreement between the Owner and the Contractor are cumulative and not in limitation of any rights of the Owner at law or in equity.

I. The Owner shall not be responsible for damages or for loss of anticipated profits on work not performed on account of any termination of the Contractor by the Owner or by virtue of the Owner's exercise of its right to take over the Contractor's work pursuant to its Agreement with the Contractor.

J. The Owner shall not be liable to the Contractor for punitive damages on account of its termination of the Contractor or any other alleged breach of the Agreement between it and the Contractor and the Contractor hereby expressly waives its right to claim such damages against the Owner.

K. The Contractor hereby expressly waives any rights it may have in law or in equity to lost bonding capacity as a result of any of the actions of the Owner, the Architect, or the Construction Manager taken in connection with the Contractor's work on the Project.

L. Upon determination by legal means (*e.g.*, court action, etc.) that termination of Contractor pursuant to Article 17.A.1 was wrongful, such termination will be deemed converted to a termination for convenience pursuant to Article 17.B.1 and Contractor's remedy for such termination shall be limited to the recovery of the payments permitted for termination for convenience as set forth in Article 17.B.1.

M. As between the Owner and the Contractor:

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

2. Between Substantial Completion and Final Certificate for Payment. As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and

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

N.

1. The Owner may occupy or use any completed or partially completed portion of the Contractor's work at any stage when such occupancy is authorized by public authorities having jurisdiction over the Project.

2. Partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of the Contractor's work, nor does it waive the Owner's right to liquidated damages. Further such occupancy alone shall not determine when Substantial Completion and performance has been reached.

3. Immediately prior to such partial occupancy or use, the Owner, the Contractor, and the Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Contractor's work, and in order to prepare a complete punch list of omissions of materials, faulty workmanship, or any items to be repaired, torn out or replaced.

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

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

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

R. This exemption shall not apply to machinery, equipment, tools, and other items purchased, leased, rented, or otherwise acquired for the Contractor's use even though the machinery, equipment, tools, or other items are used either in part or entirely on the Work. This exemption shall apply only to materials fully incorporated into the Work of the Contract as accepted and approved by the Architect.

S. The Contractor shall, upon request by the Owner, furnish a bill of sale or other instrument indicating the quantities and types of materials purchased directly by the Contractor or SubContractor for incorporation into the Work. Upon delivery of the materials to the site, the

Contractor shall mark or otherwise identify the materials to be incorporated into the Work. This exemption shall apply only to materials so identified and accepted.

END OF GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

NEW YORK STATE WAGE RATE SCHEDULES

1.1 GENERAL

- A. The following minimum prevailing rate of wages, 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 of New York State.
- B. It shall be the sole responsibility of each Contractor to pay wages at least equal to current and future Wage Rate Schedules which are applicable to this project throughout the entire duration of the Contract without claiming extra costs.
- C. Current Wage Rate Schedules are included herein. The Owner and the Architect do not warrant the accuracy or pertinency of the wage rates stated. The Contractor shall be solely responsible for verifying the accuracy of the current and future Prevailing Wage Schedule.
- D. Prevailing Rate Case Number (PRC# 2023010208) has been assigned to the project. To access the PDF file of your schedule, click on the following link or copy and paste into your browser.

<https://apps.labor.ny.gov/wpp/doFindProject.do>

- E. Notice of Award: Each Prime Contractor shall submit a notice of award of contract to the Department of Labor upon signing of contract. The above link for the PRC has a tab to submit such notice.

Prevailing Wage

[Home](#) > Prevailing Wage

[Wage Schedule](#) · [Submit Notice Of Award](#) · [Submit Notice Of Project Completion](#)

PRC#: 2023010208
Type of Contracting Agency: Local School District

Acceptance Status: Accepted Article 8

Contracting Agency

Katonah-Lewisboro School Dist.
Michael Lavoie
Director of Facilities
60 North Salem Road
Cross River NY 10518

(914) 763-7243
mlavoie@klschools.org

Send Reply To

Richard Markgraf
Project Manager
KG+D Architects, PC
285 Main Street
Mount Kisco NY 10549

(914) 666 -5900 Ext: 226
sannar@kgdarchitects.com

Project Information

Project Title	Meadow Pond ES Addition & Alts
Description of Work	Addition of a small security vestibule at Main Entrance. Interior alterations to Library and STEM lab, & upgrades to plumbing infrastructure, single pane windows & common spaces (flooring, lighting & reconfiguration of partitions for SGI spaces)
Contract Id No.	2023-1017
Project Location(s)	Meadow Pond Elementary School
Route No / Street Address	185 Smith Ridge Road / Rt. 123
Village / City	
Town	South Salem
State / Zip	NY 10590
Nature of Project	Other Reconstruction, Maintenance, Repair or Alteration
Approximate Bid Date	02/15/2024
Checked Occupation(s)	Construction (Building, Heavy & Highway, Sewer, Water, Tunnel)

Applicable Counties

Westchester

Department of Labor

[Accessibility](#)

[Contact](#)

[Language Access](#)

[Privacy Policy](#)



SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Intent of the Contract Documents
4. Type of contract
5. Scope of Work – separate Prime Contracts
6. Owner-Furnished, Contractor-Installed products
7. Owner-Furnished, Owner-Installed products
8. Work schedule and phasing
9. Coordination of Work of Separate Prime Contracts
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and drawing conventions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

- A. Project Identification: The project consists of Additions and Alterations at the Meadow Pond Elementary School located at 185 Smith Ridge Road, South Salem, NY 10590.
- B. Owner: Katonah-Lewisboro Union Free School District in Cross River, NY.
- C. Architect: The Contract Documents were prepared for Project by KG+D Architects, PC.
- D. Construction Manager: Triton Construction Management 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 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and consists of the following:

1. The scope of the Work of this project is selective demolition of interior construction and select portions of exterior walls to allow for selective renovations to the building interior spaces including the Library, STREAM Lab, Wingspaces, and miscellaneous spaces and exterior window replacement work; hazardous material abatement; and construction of a new security entrance and lobby addition.

- B. Work in Existing Building at Existing Site: 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 verify all existing conditions.

1. Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same.

1.4 INTENT OF THE CONTRACT DOCUMENTS

- A. If, in the interpretation of Contract Documents, requirements within the Drawings and Specifications conflict, or it appears that the Drawings and Specifications are not in agreement, the Contractor shall provide (1) the greater quantity, where there is a discrepancy in quantity, and (2) the superior quality, where there is a discrepancy in quality. All discrepancies shall be brought to the attention of the Architect. The Architect's decision on resolving the discrepancy shall be final.

1.5 TYPE OF CONTRACT

- A. The Work of the project will be let in four (4) separate contracts; separate Prime Contracts will be awarded for the following categories of work:
 1. Contract No. 1: General Construction Work.
 2. Contract No. 2: Plumbing Work.
 3. Contract No. 3: HVAC Work.
 4. Contract No. 4: Electrical Work
- B. Responsibilities assigned to each separate Prime Contractor and the scope of the Work included in each contract is clearly identified in the Specifications and Drawings.
- C. One set of Documents is issued covering all contracts. Each Prime Contractor shall review all drawings and specifications for complete understanding and knowledge of the Work.

1.6 SCOPE OF WORK – SEPARATE PRIME CONTRACTS

- A. Each Prime Contractor is responsible for all of Procurement and Contracting Requirements (Division 00), General Requirements (Division 01), and all work specifically indicated, including the following:

1. General Construction Work: Architectural, hazardous material abatement, structural, civil and landscape drawings, and specifications contained in Division 02 through 14, 31, 32, and 33 except where specifically noted by others, and as specifically required to complete the work of the general construction installations.
 2. Plumbing Work: P-Series Drawings and specification sections in Division 22 and such work types, such as cutting and patching, as specifically required to complete the work of the plumbing installations.
 3. HVAC Work: M-Series Drawings and specification sections in Division 23 and such work types, such as cutting and patching, as specifically required to complete the work of the HVAC installations
 4. Electrical Work: Electrical drawings and specifications contained in Division 26 and such work types, such as cutting and patching, as specifically required to complete the work of the electrical installations
- B. All Prime Contractors are responsible to provide a complete installation of their work with the exception of such work that is specifically indicated to be by another Contractor. Exceptions or clarifications are as follows:
1. Cutting and patching in the existing building generally will be by the trade needing that work. When mechanical or electrical work is above a ceiling, not being replaced by the GC, the Prime doing that work will be responsible for providing their own access and restoration.
 2. Exceptions for cutting and patching at the existing building will be:
 - a. The GC will be responsible for penetrations through the existing façade and roof.
 3. All trades shall coordinate, schedule, and sequence work so no cutting and patching is required in any new slabs (or the trade failing to comply would be responsible).
 4. Excavation for any sub grade mechanical / plumbing (within 5'-0" of the building) would be by the trade requiring same unless specifically noted otherwise on the drawings. (Outside of 5'-0", including any structures would be by the GC, who would provide their own excavation.)
 5. Fire-safing / fire-stopping will be by the trade needing / installing that work.
 6. All trades to provide access doors as required by their work, to be installed by the GC.
- 1.7 OWNER-FURNISHED CONTRACTOR-INSTALLED PRODUCTS
- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections.
- B. Owner-Furnished Contractor-Installed Products:
1. Toilet accessories in classrooms and toilet rooms.

1.8 OWNER-FURNISHED OWNER-INSTALLED PRODUCTS

- A. Owner will furnish and install products indicated.
- B. Owner-Furnished Contractor-Installed Products:
 - 1. Code-required signage at interior to obtain Certificate of Occupancy

1.9 WORK SCHEDULE AND PHASING

- A. The Work shall be substantially complete on or before the date(s) indicated in the Project Milestone Schedule attached to this Section. It is extremely important that the Owner resume its full use of the buildings and sites on the completion date(s) specified. Liquidated damages will be assessed by the Owner for each day the work continues past the Substantial Completion date.
- B. The Work shall be conducted in accordance with the logistics drawings LP-1 and LP-2 and the milestone schedules included in the contract documents.
- C. Work may be commenced in the building and on the site on the date(s) indicated in the Project Milestone Schedule attached to this Section.

1.10 COORDINATION OF WORK OF SEPARATE PRIME CONTRACTS

- A. Project Coordinator shall be responsible for coordination between the Separate Prime Contracts
 - 1. Construction Manager shall act as Project Coordinator.

1.11 ACCESS TO SITE

- A. Limits: Confine constructions operations to areas within contract limits indicated. Do not disturb portions of the building and site beyond the areas in which the Work is indicated. All areas of the building and site with the exception of the project area where the Work is being performed are off limits to Contractor and his employees.
 - 1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, students, the public and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - 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.
- B. Damages: Promptly repair damages caused to adjacent facilities by work of the Contract to a good-as-new condition acceptable to the Owner.

1. Provide photos or videos to establish existing conditions prior to commencement of the Work.
- C. Existing Facilities: The following facilities are specifically noted as not to be used by Contractor or his employees:
1. Toilet facilities.
 2. Food service facilities, including kitchen and dining areas.
 3. Parking lots (outside of the parking areas designated for Contractor's use).
 4. Telephones.
- D. Security: The Contractor and all employees of the contractor shall be subject to the security provisions required by the Owner. Such provisions shall include, but not be limited to, the following:
1. Contractor and all their employees shall use a single means of access and egress to the building, except in the case of emergency, as designated by the Construction Manager.
 2. Photo identification badges shall be procured for all persons entering the Project building or site and shall be worn continuously while the person is in the building or on the site.
 3. All persons entering the building or site shall be subject to the Owner's visitor management system, and may be subject to fingerprinting or other security-related screenings.
 4. Contractor shall maintain a daily list of their personnel at the Project site.
 5. All workers on the site shall wear hi-vis clothing and PPE while on site at all times.

1.12 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and building during 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 day-to-day operations.
1. Maintain access to existing adjacent occupied or used facilities. Do not close or obstruct adjacent drives, walkways, or other occupied or used facilities other than those obstructions currently indicated on the Contract Documents without written permission from Owner and approval of authorities having jurisdiction.
 2. Occupancy level will be reduced during summer months when school is not in session.
- B. Utility Shutdowns: Coordinate all utility shut downs and cross overs with the Construction Manager, schedule during off hours and non-occupied times only.
1. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations. Include planned shut-downs and interruptions in Construction Schedule.

2. 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
- C. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.13 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours and Days: Limit work on the site and in the building to working hours indicated below, Monday through Friday, unless otherwise indicated.
1. The school will be closed on Saturdays, Sundays, regularly scheduled district holidays and school vacations, and at night after cleaning crews have finished. If any Contractor wishes to work at any time when the school is normally closed, that Contractor must receive prior approval by the Owner and also shall arrange and pay for custodial services for the building at the applicable district pay rates. All work taking place within the schools/buildings/grounds on weekends, holidays and school vacations must be approved in advance by the Owner.
 2. Summer Work Period Hours and Days: During the Summer work will be permitted between 7:00 AM and 4:00 PM all days except Saturday and Sundays. Any special work arrangements must be made through the Owner.
 3. School-in-Session Period Hours and Days: Work during the School Year must be scheduled after School Hours between 3:00 PM until 10:00 PM. During the school year the school will be closed at 11:00 PM. Any requests to work during school hours must be submitted in writing to the School District for approval. Non disruptive work may take place between 7:00 AM and 4:00 PM upon receiving permission from the Owner. The submission must include a diagram showing how the construction area will be separated from occupied areas. Additionally, it must show temporary measures to be installed such as

ventilation, screening, dust protection, fire separation, etc. The School District reserves it's right to accept or reject the request at their discretion.

4. Blackout Dates (No work is permitted at the building or site): Concerts and testing dates, other days as directed by the Owner. Allow for 5 blackout days, taken during the weekdays, as selected by the Owner.
 5. The school district's academic calendar listing school-in-session period, summer period, school holidays and vacation days, and Regents Exam days can be found here <https://echalk-slate-prod.s3.amazonaws.com/private/districts/328/site/fileLinks/20314eeb-005c-4fcc-80a0-1d6d3f124006?AWSAccessKeyId=AKIAJSZKIBPXGFLSZTYQ&Expires=2000400339&response-cache-control=private%2C%20max-age%3D31536000&response-content-disposition=%3Bfilename%3D%222023-2024%2520School%2520Year%2520Calendar%2520-%2520BOE%2520Approved%25201%252019%25202023.pdf%22&response-content-type=application%2Fpdf&Signature=4EyRfVpoy1msJ5yxpmSZi3cbjdg%3D>
- C. Delivery Restrictions: Coordinate with the Construction Manager for permissible times and locations/truck access for deliveries on site. Large deliveries shall be made after hours. All deliveries while school is in session shall be made before 7:00 am and after 4:00 pm Monday through Friday.
- D. Noise, Vibration, and Odors: Notify Construction Manager and coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to surrounding spaces.
1. Notify Construction Manager not less than two days in advance of proposed disruptive operations.
 2. Construction activity noise levels for a period extending from the reading days before exams until the final day of exams (ten days) shall not exceed 60 dBA
- E. Comply with Owner's standards for construction projects as follows:
1. Interaction with employees, students and the public 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 is prohibited on the site and in the buildings.
 5. Fraternalizing with students or staff at the University is prohibited.
 6. Use of controlled substances, cannabis and alcohol on Project site is not permitted.

1.14 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

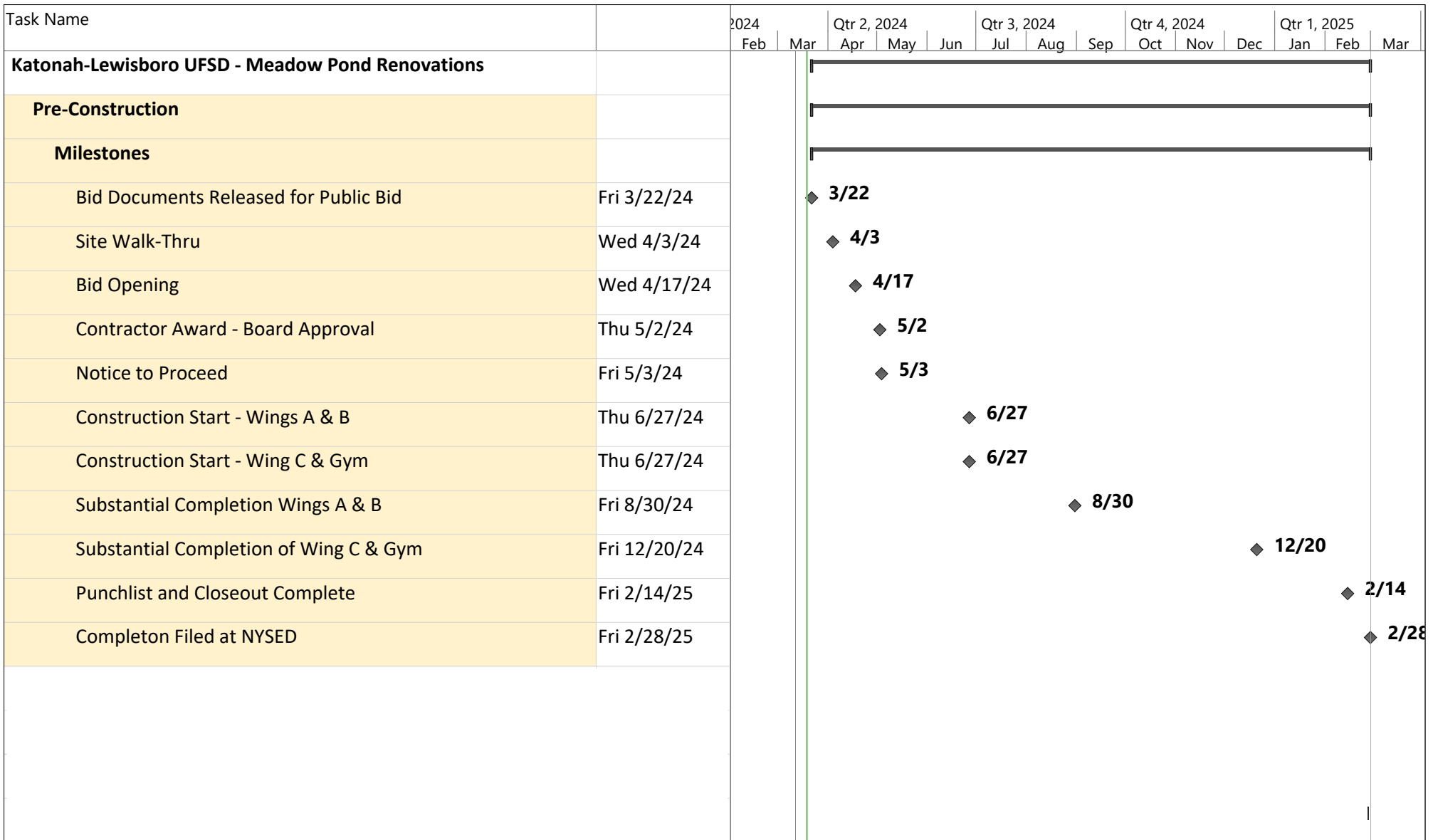
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

Attachment: Project Milestone Schedule



Katonah-Lewisboro UFSD
Meadow Pond Renovations
Milestone Bid Schedule: Tue 3/19/24

Task		Inactive Summary		External Tasks	
Split		Manual Task		External Milestone	
Milestone		Duration-only		Deadline	
Summary		Manual Summary Rollup		Progress	
Project Summary		Manual Summary		Manual Progress	
Inactive Task		Start-only			
Inactive Milestone		Finish-only			

SECTION 011011 - REGULATIONS OF THE COMMISSIONER OF EDUCATION - 8 NYCRR
155.5 - UNIFORM SAFETY STANDARDS FOR SCHOOL CONSTRUCTION AND
MAINTENANCE PROJECTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes Regulations of the Commissioner of Education - 8 NYCRR 155.5 - Uniform Safety Standards for School Construction and Maintenance Projects.

1.2 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.

2. 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.

1. 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 non combustible construction. The isolated portion of the building must contain exits that do not pass through the occupied portion and ventilation systems must be physically separated and sealed at the isolation barrier.
1. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011011

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate #1 (ADD ALTERNATE) LIBRARY AND STREAM LAB RENOVATIONS: Full scope of renovation of the Library and STREAM Lab spaces. Scope extends to all removals, finishes, MEP systems, power, and data.
1. Base Bid includes no work in these areas. The rooms shall remain as is if the alternate is not taken.
 2. Applicable Contracts:
 - a. Contract No. 1 General Construction Work.
 - b. Contract No. 2 Plumbing Work
 - c. Contract No. 3 HVAC Work
 - d. Contract No. 4 Electrical Work
- B. Alternate #2 (ADD ALTERNATE) REMAINING FINISHES OF WINGS A, B, AND C: All scoped flooring (abatement and replacement), and finish work. Includes reconfiguration (removal of existing and new construction, as indicated) of SGIs.
1. Base Bid includes HVAC work and related work of Wings A, B and C; work necessary to complete installation of new duct and mechanical work. New ceilings, lighting and fire alarm work are included. This scope includes the HVAC work in A2 and A2.1 and associated ceiling, lighting and finish work.
 2. Applicable Contracts:
 - a. Contract No. 1 General Construction Work.
 - b. Contract No. 4 Electrical Work
- C. Alternate #3 (ADD ALTERNATE) WINDOW REPLACEMENT: Remove existing single glazed window system and replacement with insulated thermal window system.
1. Base Bid includes no work at the existing windows. Existing windows shall remain if the alternate is not taken.
 2. Applicable Contracts:
 - a. Contract No. 1 General Construction Work.
- D. Alternate #4 (ADD ALTERNATE) SIGNAGE AND INFRASTRUCTURE UPGRADES: All Work to provide the following:
- Replace water fountains with bottle filler stations.
 - Replace existing doors to provide smoke doors
 - Replace existing wire glass with new safety glass
 - Provide new single user toilet rooms at original classroom spaces
 - Provide portable handicapped lift for stage (coordinate with Owner)
 - Provide all new signage
1. Base Bid includes no work for any of these items; existing conditions will remain the same if this alternate is not selected.

22 March 2024
Issued for Bid

Katonah-Lewisboro Union Free School District
Additions and Alterations to Meadow Pond Elementary School
SED No. 66-01-01-03-0-007-016

2. Applicable Contracts:
 - a. Contract No. 1 General Construction Work.
 - b. Contract No. 2 Plumbing Work
 - c. Contract No. 3 HVAC
 - d. Contract No. 4 Electrical Work

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for products selected under an alternate.
 - 2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and assemblies which deviate from the requirements of the Contract Documents and proposed by Contractor which the Contractor deems will perform the same function and have equal capabilities, service life, economy of operations, and suitability for the intended purpose.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit requests for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use the electronic version of form included as an attachment to this Section; submit in portable document format (.pdf).
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.

- c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures in .pdf format.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order.
- 1.4 QUALITY ASSURANCE
- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.
- 1.5 PROCEDURES
- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days after Notice of Award.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution does not require revisions to the Contract Documents.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified or superior warranty.
 - i. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule; or if requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
 - j. Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
 - k. Maintenance service and source of replacement parts, as applicable, is available similar to the specified product.
 - l. Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
 - m. Proposed substitution does not affect dimensions and functional clearances.
 - n. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 15 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied,

Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- b. Requested substitution does not require revisions to the Contract Documents or, if revisions are required, the Contractor acknowledges that the cost of the Architect's redesign fee will be deducted from the Contract Price.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified or superior warranty.
- j. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule; or if requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- k. Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- l. Maintenance service and source of replacement parts, as applicable, is available similar to the specified product.
- m. Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- n. Proposed substitution does not affect dimensions and functional clearances.
- o. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

ATTACHMENT: SUBSTITUTION REQUEST FORM

SUBSTITUTION REQUEST FORM

To:

Project:

<u>Section</u>	<u>Page</u>	<u>Paragraph</u>	<u>Specified Item</u>

THE UNDERSIGNED REQUESTS CONSIDERATION OF THE FOLLOWING SUBSTITUTION:

Attached data shall include, in a tabular format to provide a line by line comparison - product description, specifications, drawings, photographs, performance and laboratory tests and the like with applicable portions of said data clearly identified.

FURTHER, The Proposed Substitution WILL (OR WILL NOT) Affect:

- Dimensions indicated on the drawings? _____
- Wiring, piping, ductwork, or other building services indicated on the drawings? _____
- Other trades and abutting or interconnection work? _____
- Manufacturer's guarantees and warranties? _____
- The construction schedule? _____
- Maintenance and service parts locally available? _____

(NOTE - If Substitution WILL affect any item above, explain in detail.)

In addition to the above, the undersigned agrees to pay for -

1. Any and all changes to the building design, including structural, civil or electro/mechanical systems engineering (if any), detailing; and
2. Any and all additional construction costs caused by the requested substitution.

The undersigned further states that the function, appearance and quality of the Proposed Substitution are equivalent or superior to the Specified Item.

SUBMITTED:		DESIGN PROFESSIONAL'S COMMENTS	
By: _____		Accepted	Accepted as Noted
Firm: _____		Not Accepted	Received Too Late
Address: _____			
			By: _____
Date: _____			Date: _____
Telephone/Fax: _____			Remarks: _____
Approved For Subcontractor Submittal: _____			
By: _____	Contractor: _____	Date: _____	

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.

1.4 ADMINISTRATIVE CHANGE ORDERS

- A. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes 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. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect and Construction Manager within 10 days after Notice of Award of Contract or at the preconstruction meeting, whichever comes first.
- B. Format and Content: Use 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:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Name of Construction Manager
 - d. Architect's project number.
 - e. SED number
 - f. Contractor's name and address.
 - g. 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 reflect value.
 - g. Dollar value as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum. 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. If required, include evidence of insurance.
 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.
 9. Include a line item for each of the following in the specified percentage of the Contract Sum:
 - a. Bonds/insurance, general conditions, meeting attendance, and meeting documentation: 2% minimum
 - b. Submittals and shop drawings: 1% minimum
 - c. Labor and materials on line items, temporary utilities and services, HVAC balance reports, coordination drawings and punch list: 1% minimum
 - d. Warranties/guarantees and close out: 3%
 10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when fully executed Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

- A. General: Refer to Article 9(C) of the General Conditions.
- B. Payment Application Times: Refer to Article 9(C) of the General Conditions
- C. Application for Payment Forms: Refer to Article 9(C) of the General Conditions.
- D. Application Preparation: Refer to Article 9(C) of the General Conditions.
- E. Stored Materials: Refer to Article 9(E) of the General Conditions.
- F. Payrolls and Payroll Records: Refer to Article 9(I) of the General conditions
- G. Waivers of Mechanic's Lien: Refer to Article 9(D)(3) of the General Conditions.
- H. 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 Form and/or Final Waiver of Liens Form as applicable, and Payroll Certification on the forms 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.
- I. Transmittal: Submit two signed and notarized original copies of each Application for Payment to the Construction Manager by a method ensuring receipt within 24 hours. Both copies shall include waivers of lien, payroll certification forms and all other required attachments.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- J. 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. Submittal 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
- K. Application for Payment at Substantial Completion: After Architect issues 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.
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. Final Payment Application: After completing Project closeout requirements, 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 Waiver of Liens Form
 9. 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.
 10. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

Attachments: Partial Waiver of Liens Form
Final Waiver of Liens Form
Payroll Certification 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 date below and to be legally bound hereby:

WITNESS: _____ FIRM: _____

BY: _____ 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

CONTRACTOR/VENDOR FINAL RELEASE AND LIEN WAIVER

The undersigned represents and warrants that it has been paid and has received (or that it will be paid and will receive via proceeds from this pay application) \$_____ as full and final settlement under the contract/agreement dated _____ (including any amendments or modifications thereto) (the "Contract") between the undersigned and _____ ("Contractor/Vendor") for the _____ Project owned by _____ ("Owner") (PO Number: _____). In consideration for this final payment, and other good and valuable consideration, receipt of which is acknowledged, the undersigned makes the following representations and warranties:

- 1. The undersigned and Owner have fully settled all terms and conditions of the Contract (including any amendments or modifications thereto), as well as any other written or oral commitments, agreements, and/or understandings in connection with the Project.
2. The undersigned has been paid in full (or it will be paid in full via proceeds from this pay application) for the labor, services, and materials in connection with the Contract, including all work performed or any materials provided by its subcontractors, vendors, suppliers, materialmen, laborers, or other persons or entities.
3. The undersigned has paid in full (or it will pay in full via proceeds from this pay application) all its subcontractors, vendors, suppliers, materialmen, laborers, and other person or entity providing services, labor, or materials to the Project; there are no outstanding claims, demands, or rights to liens against the undersigned, the Project, or the Owner in connection with the Contract on the part of any person or entity; and no claims, demands, or liens have been filed against the undersigned, the Project, or the Owner relating to the Contract.
4. The undersigned releases and discharges Owner from all claims, demands, or causes of action (including all lien claims and rights) that the undersigned has, or might have, under any present or future law, against Owner in connection with the Contract. The undersigned hereby specifically waives and releases any lien or claim or right to lien in connection with the Contract against Owner, Owner's property, and the Project, and also specifically waives, to the extent allowed by law, all liens, claims, or rights of lien in connection with the Contract by the undersigned's subcontractors, materialmen, laborers, and all other persons or entities furnishing services, labor, or materials in connection with the Contract.
5. The undersigned shall indemnify, defend, and hold harmless Owner from any action, proceeding, arbitration, claim, demand, lien, or right to lien relating to the Contract, and shall pay any costs, expenses, and/or attorneys' fees incurred by Owner in connection therewith.

The undersigned makes the foregoing representations and warranties with full knowledge that Owner shall be entitled to rely upon the truth and accuracy thereof.

DATED: _____ (Contractor/Vendor company name)
By: _____
Title: _____

STATE OF _____
COUNTY OF _____

I, a Notary Public for the above County and State, certify that _____ personally came before me this day and acknowledged that he/she is _____ [title] of _____ [company name], and that he/she, as _____ [title], being authorized to do so, executed the foregoing on behalf of _____ [company name]. Witness my hand and official seal this ____ day of _____, 20__.

Notary Public

My Commission Expires: _____

NOTICE: THIS DOCUMENT WAIVES RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID.

PAYROLL CERTIFICATION

_____ am an officer with the title of _____

in the firm of _____ and am authorized by that firm to sign and swear, under penalty of perjury, to the validity and accuracy of the statements below.

(1) I pay or supervise the payment of laborers, workers and mechanics employed by _____ on the _____ project. During the payroll period commencing on the _____ day of _____ 20__ and ending the _____ day of _____ 20____ all laborers, workers and mechanics employed on said project were paid the wages and supplements recorded as earned on the attached payroll records. No deductions have been made either directly or indirectly from the wages and supplements other than deductions shown on the payroll records.

(2) The payroll records submitted for the above project and attached hereto are correct and complete, and the wage rates for laborers, workers, and mechanics contained therein are not less than the applicable wage rates stated in the Contract and as designated by the State Labor Department. The number of hours shown for each employee reflects the actual hours worked by that employee. The classification shown for each employee is accurate and conforms with the work he or she performed.

(3) Supplements required in the Contract that are in addition to the basic hourly wages have been or will be paid to the appropriate plans, funds or programs.

(4) Such statement so to be filed shall be verified by the oath of the Contractor that he or she has read such statement subscribed by him or her and knows the content thereof, and that the same is true of his or her own knowledge except with respect to wages and supplements owing by subcontractors which may be certified upon information and belief.

(5) All employees of this firm have submitted completed Form I-9, Employment Eligibility Verification Form which has been reviewed and signed by authorized representatives of the firm and are kept in the employees' file. Also, any and all subcontractors have certified to us that all of their employees have submitted completed Form I-9 Employment Eligibility Verification Form, which have been reviewed and signed by authorized representatives of the firm and are kept in the employees' file.

By: _____

Firm Name _____

Title: _____

Firm _____

Date: _____

Address _____

Prime

Subcontractor

NOTARY

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Requests for Information (RFIs).
 - 3. Project Information Management (PIM) software.
 - 4. Project meetings.
- B. Related Requirements:
 - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.2 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.
- B. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
 - 4. Submit list of subcontractors within 10 days after Notice of Award of Contract or at the preconstruction meeting, whichever comes first.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel 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, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates 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. Keep list current at all times.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction 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 to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination, Multiple Prime Contracts: 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
- C. 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 Owner and separate contractors if coordination of their Work is required.
- D. 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.
 8. Startup and adjustment of systems.

- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.
- F. Use of the Site: The Construction Manager will administer allocation of available space equitably among separate Prime Contractors and other entities needing access and space, so as to produce the best overall efficiency in performance of the total work of the project. Each Contractor shall schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

1.5 REQUESTS FOR INFORMATION (RFIs)

- A. Requests for Information (RFI's) are requests for clarifications or questions regarding the contract drawings and specifications, not contract terms, scheduling items, or general correspondence, nor, are they to be as a means to describe or request approval of alternate construction means, methods or concepts or substitution for materials, systems means and methods.
 - 1. Carefully study and compare the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, and prior Project correspondence and documentation prior to submitting a Request for Information.
- B. Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall 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. Architect will return RFIs submitted to Architect by other entities controlled by Contractor 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 information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Architect and Construction Manager
 - 6. RFI number, numbered sequentially.
 - 7. RFI subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.
 - 10. Field dimensions and conditions, as appropriate.

11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- D. RFI Forms: Architect will furnish electronic version of form bound in Project Manual.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- E. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. Based upon the amount of RFI's received and their level of content, the Architect will establish the level of importance of each RFI and allow sufficient time in the Architect's professional judgment to permit adequate review.
 2. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 3. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 4. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit a change proposal according to the General Conditions of the Contract
 - a. If the Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 15 calendar days of receipt of the RFI response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly; include the following: .
1. Project name.
 2. Name and address of Contractor.

3. Name and address of Architect and Construction Manager.
4. RFI number including RFIs that were returned without action or withdrawn.
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.

- 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.

1.6 PROJECT INFORMATION MANAGEMENT (PIM) SITE

- A. Use Architect's Project Information Management (PIM) software transmission server software for purposes of hosting and managing project communication and documentation until Final Completion. Project Information Management (PIM) software site includes the following functions:

1. Project directory.
2. Project correspondence.
3. Meeting minutes.
4. Contract modifications forms and logs.
5. RFI forms and logs.
6. Task and issue management.
7. Photo documentation.
8. Schedule and calendar management.
9. Submittals forms and logs.
10. Payment application forms.
11. Drawing and specification document hosting, viewing, and updating.
12. Online document collaboration.
13. Reminder and tracking functions.
14. Archiving functions.

- B. Architect will provide Project Information Management (PIM) software user licenses for use of the Owner, Contractor, Construction Manager, and Architect's consultants.

- C. The Architect utilizes Submittal Exchange Project Information Management (PIM) software to track submittals and RFI's.

- D. Post electronic submittals as PDF electronic files directly to Architect's submittal Exchange server, specifically established for Project.

1.7 PROJECT MEETINGS

- A. General: The 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 and Architect 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 and distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three days of the meeting.
- B. Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 14 days after Notice to Proceed.
- a. 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.
 - b. Agenda: Discuss items of significance that could affect progress, including the following:
 - 1) Tentative construction schedule.
 - 2) Phasing.
 - 3) Critical work sequencing.
 - 4) Designation of responsible personnel.
 - 5) Procedures for processing field decisions and Change Orders.
 - 6) Procedures for processing Applications for Payment.
 - 7) Distribution of the Contract Documents.
 - 8) Submittal procedures.
 - 9) Preparation of Record Documents Procedures for RFIs.
 - 10) Use of the premises and existing building.
 - 11) Work restrictions.
 - 12) Working hours.
 - 13) Owner's occupancy requirements.
 - 14) Procedures for moisture and mold control.
 - 15) Procedures for disruptions and shutdowns.
 - 16) Construction waste management and recycling.
 - 17) Parking availability.
 - 18) Office, work, and storage areas.
 - 19) Equipment deliveries and priorities.
 - 20) First aid.
 - 21) Progress cleaning.
 - 22) Responsibility for temporary facilities and controls.
 - 23) Security
 - 24) Waste management protocols.
 - c. Contractor shall submit the following items at this meeting:

- 1) Preliminary Contractor's Construction Schedule (if schedule has not yet been submitted).
 - 2) List of Subcontractors.
 - 3) Schedule of Values.
 - 4) Submittal Schedule.
 - 5) Products List (Proposed products and manufacturers including any substitution products proposed).
2. Minutes: Construction Manager will record and distribute meeting minutes.
- C. Preinstallation Conferences: 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 and Construction Manager of scheduled meeting dates.
 2. Agenda: 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 RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. 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. Project Closeout Conference: Construction Manager will schedule and conduct a project closeout conference, at a time convenient to Contractor, Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Construction Manager will conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing operations and maintenance data.
 - e. Requirements for delivery of material samples, attic stock, and spare parts.
 - f. Requirements for demonstration and training.
 - g. Preparation of Contractor's punch list.
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Coordination of separate contracts.
 - k. Owner's partial occupancy requirements.
 - l. Installation of Owner's furniture, fixtures, and equipment.
 - m. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Construction Manager will conduct progress meetings at bi-weekly or twice monthly intervals.
1. Coordinate preparation of payment requests with dates of meetings.
 2. Attendees: In addition to representatives of Owner, Contractor 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 meeting 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.
 - 1) Review schedule for next period (2-week look ahead schedule)
 - 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) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Construction Change Directives.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
 - 20) Waste management.
4. Minutes: Construction Manager will record and distribute the meeting minutes to each party present, to others affected by decisions or actions resulting from each meeting and to parties requiring information.

- 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
- F. Coordination Meetings: Construction Manager will conduct Project coordination meetings at bi-weekly intervals or as required by the Construction Manager. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. 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
 2. Agenda: Coordinate work for the ensuing two weeks. 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.
 - a. At the close of the meeting, each prime Contractor shall, in an agreed format, provide a summarized two week work plan to the Construction Manager.
 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

ATTACHMENT:

REQUEST FOR INFORMATION FORM

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: 914-666-0051
Email:		Email: rmarkgraf@kgdarchitects.com
Project Name:		Project Location:
RFI Number:	Date of Request:	Requested Date of Response (5 business days minimum):
Description, complete with backup data as necessary attached hereto:		
Sketches of Conditions	Specification Paragraph Reference(s):	Drawing Reference(s):
Proposed Solution:		
Cost Impact:		Time Impact:
Trade/Specialty Contractors Affected:		
Trade/Specialty Contractors Coordinated With:		
Submitted By:		
Architect's Response:		
By:		Date of Response:

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 21, 22, 23, 26, 27 and 28 for additional requirements.

1.2 DEFINITION AND INTENT

- A. The Contract Drawings 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 MEP equipment rooms shall be maintained as indicated on the Architectural 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.
- G. Fully coordinated Ceiling Coordination Drawings must be received and approved by the Architect before any associated ceiling shop drawings of any trade will be reviewed.
- H. Sprinkler heads depicted on architectural drawings are intended to indicate design intent of layout only.

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, Construction Manager 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 Prime Contractor shall be assigned a layer to create the detailing work of each section or division of the Specifications requiring coordination. Each Prime Contractor shall ensure that the layer assigned to them cannot be modified by another Contractor or trade, and that the final product clearly differentiates which Contractor or trade is responsible for the respective information shown. The latter may occur through the use of colors or other distinct graphic methods.
- C. The Construction Manager will assume overall coordination responsibilities for the preparation of the coordination drawings, and shall work in collaboration with each Prime Contractor to coordinate work by more than one contract.
 - 1. The Construction Manager will coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components.

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 1-1/4-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. Fire Protection System Information Required in Coordination Drawings:

1. Locations of standpipes, valves, mains piping, branch lines, pipe drops, and sprinkler heads.
2. Bottom elevation of main and branch lines.

F. 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.

G. Ceiling Systems and Plenum Space in Coordination Drawings:

1. For mechanical, plumbing, fire protection, 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 CONFLICTS IN COORDINATION DRAWINGS

- A. The Construction Manager will review the Coordination Drawings to identify areas of conflicts and obstacles, and together with the separate Prime Contractors, work to resolve the trade conflicts as well as clashes within each trade, until all conflicts are fully coordinated.
 - 1. Each Prime Contractors shall revise their respective portions of the Coordination Drawings to eliminate the collisions and interferences identified.
 - 2. Each Prime Contractor shall determine that all work can be installed without interference.
 - 3. Each Prime Contractor shall approve the revised Coordination Drawings in writing indicating approval of installation coordination and clearances.
- B. In the case of unresolved interference, the Construction Manager will notify the Architect. The Architect will then suggest to the Construction Manager as to how to revise the Coordination Drawings to eliminate interference. The Prime Contractors shall then revise their respective Drawings to eliminate the interference.
 - 1. Each Prime Contractor shall approve the revised 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 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Startup construction schedule.
 2. Contractor's construction schedule.
 3. Construction Manager's construction schedule.
 4. Project construction schedule
 5. Construction schedule updating reports.
 6. Daily construction reports.
 7. Site condition reports.
 8. Special reports.
- B. Related Requirements:
1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
 2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 2. Predecessor Activity: An activity that precedes another activity in the network.
 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.

1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Milestone: A key or critical point in time for reference or measurement.
- G. Contractor's Construction Schedule: A construction schedule for the Work of a Prime Contractor, prepared by that Prime Contractor.
- H. Construction Manager's Construction Schedule: A construction schedule for the Project, prepared by the Construction Manager with no input from Prime Contractors, indicating milestones, Phasing, and other general requirements for the prosecution of the Work of all Contracts.
- I. Project Construction Schedule: A coordinated construction schedule for the Project, prepared and maintained by the Construction Manager, indicating an overall construction schedule for the entire Project with input from all Prime Contractors, coordinated by the Construction Manager, and accepted by all Prime Contractors.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
1. PDF electronic file.
- B. Startup construction schedule.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals
 2. Construction Manager will review schedule for compliance with Construction Manager's Construction Schedule
- E. Construction Schedule Updating Reports: Submit with Applications for Payment.
- F. Daily Construction Reports: Submit at monthly intervals.
- G. Site Condition Reports: Submit at time of discovery of differing conditions.
- H. Special Reports: Submit at time of unusual event.
- I. Qualification Data: For scheduling personnel.

1.4 QUALITY ASSURANCE

- A. Scheduling Personnel Qualifications: A consultant or a person in the Contractor's employ who is experienced in CPM project scheduling and reporting, with capability of reviewing Construction Manager's Construction Schedule and Project Construction Schedule, correlating them with Contractor's Construction Schedule, and providing feedback reports within time schedule specified.
- B. Prescheduling Conference: After receipt of preliminary Contractor's Construction Schedule from all Prime Contractors, Construction Manager will conduct a schedule review and coordination conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Construction Manager will review methods and procedures related to the Project Construction Schedule including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Review submittal requirements and procedures.
 - 4. Discuss constraints, including phasing, area separations, interim milestones and partial Owner occupancy.
 - 5. Review delivery dates for Owner-furnished products.
 - 6. Review schedule for work of Owner's separate contracts
 - 7. Review time required for review of submittals and resubmittals.
 - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 9. Review time required for completion and startup procedures.
 - 10. Review and finalize list of construction activities to be included in schedule.
 - 11. Review procedures for updating schedule.
 - 12. Discuss constraints, including phasing work

1.5 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. The form of the Contractor's Construction Schedule will be a CPM schedule.
- B. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- C. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- D. Time Frame: Extend schedule from date established for the Notice of Award to date of final completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- E. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- F. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use-of-premises restrictions.

- f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
- a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
- G. Milestones: Include milestones indicated in the Contract Documents and in the Construction Manager's Construction Schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the interim milestones indicated on the Schedule.
- H. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
- 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and Contract Time.
- I. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
- 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
 - 4. In no event shall any progress report constitute an adjustment in the Contract Time, any Milestone Date or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to Change Order.

- J. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- K. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.7 PROJECT CONSTRUCTION SCHEDULE

- A. Form: The form of the Project Construction Schedule will be a CPM schedule.
- B. Responsibilities: The Construction Manager will provide services as the overall project scheduling coordinator for Project planning, scheduling and control. The Construction Manager will prepare and maintain the overall Project Construction Schedule with input from the Prime Contractors.
- C. Preparation: The procedure for the preparation of the Project Construction Schedule shall be as follows:
 - 1. Within 10 days after Notice of Award of Contract or at the preconstruction meeting, whichever comes first, each Prime Contractor shall prepare and submit to the Construction Manager, for review and coordination, a detailed start up Contractor's Construction Schedule for his Work showing the details of his compliance with the Construction Manager's Construction Schedule. Contractor's Construction Schedule shall indicate that the Phases of the Project be Substantially Complete by the dates indicated in the Construction Manager's Construction Schedule.
 - 2. The Construction Manager will review the Contractor's Construction Schedule and shall advise the Contractor if its schedule is acceptable for incorporation into the Project Construction Schedule, or if revisions will have to be made.
 - 3. Each Prime Contractor shall cooperate with each other and with the Construction Manager in coordinating each Contractor's Construction Schedule to produce the Project Construction Schedule.
 - 4. When the coordinated Project Construction Schedule is produced by the Construction Manager, each Prime Contractor shall signify acceptance of Schedule by signing the schedule.
- D. Updates/Revisions: The Construction Manager will update the Project Construction Schedule at bi-weekly intervals to reflect actual construction progress and activities, based on feedback reports of Prime Contractors. Each Prime Contractor shall issue

revised scheduling report (update) to the Construction Manager one week before each regularly scheduled progress meeting.

1. Construction Manager will revise Project Construction Schedule immediately after each meeting or other activity where revisions have been recognized or made. Construction Manager will issue updated schedule concurrently with the report of each such meeting.
 2. As the Work progresses, Project Construction Schedule will indicate Actual Completion percentage for each activity.
 3. The Contractor shall monitor the progress of its work for conformance with the requirements of the construction schedule and shall promptly advise the Construction Manager of any delays or potential delays.
 4. If a schedule update is not submitted by the Contractor in a timely fashion, the Contractor shall accept the Project Construction Schedule prepared by the Construction Manager as the construction schedule to be used in carrying out its work and the Contractor waives its rights to claim damage or delay associated with the time requirements set forth in the updated Project Construction Schedule.
 5. The Owner reserves the right to adjust the Project Construction Schedule from time to time during construction to mitigate unavoidable problems and ensure that the Project Completion Date is achieved. Contractor shall comply with the adjusted Project Construction Schedule without additional cost.
 6. When an updated Project Construction Schedule is produced by the Construction Manager, each Prime Contractor shall signify acceptance of Schedule by signing the schedule.
- E. Distribution: Construction Manager will distribute copies of approved schedule to Prime Contractors, Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Construction Manager with a need-to-know schedule responsibility.
1. Construction Manager will post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, Construction Manager will distribute updated schedules to the same parties and post in the same locations. Parties will be deleted from distribution list when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.
- F. Prime Contractors' Acceptance of Project Construction Schedule: The initial and each updated Project Construction Schedule shall be signed by each Prime Contractor, indicating acceptance of such schedule.
1. A copy of the initial Project Construction Schedule signed and accepted by Prime Contractor shall be attached to the initial Application for Payment. No payment will be processed by the Owner until such document has been received.
 2. A copy of the most current Project Construction Schedule signed and accepted by Prime Contractor shall be attached to each succeeding Application for Payment. No payment will be processed by the Owner until such document has been received.

1.8 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within 10 days after Notice of Award of Contract or at the preconstruction meeting, whichever comes first.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 CPM SCHEDULE REQUIREMENTS

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice of Award. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice of Award.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
 - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.

- b. Preparation and processing of coordination drawings.
 - c. Mobilization and demobilization.
 - d. Purchase of materials.
 - e. Delivery.
 - f. Fabrication.
 - g. Utility interruptions.
 - h. Installation.
 - i. Work by Owner that may affect or be affected by Contractor's activities.
 - j. Testing and commissioning.
 - k. Punch list and final completion.
 - l. Activities occurring following final completion.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.

4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

1.10 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit

with a Request for Information. Include a detailed description of the differing conditions.

1.11 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

END OF SECTION 013200

SECTION 013233 – PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for the following work by the Contractor:
 - 1. Preconstruction photographs.
 - 2. Preconstruction videos.

1.2 SUBMITTALS

- A. Key Plan: Submit key plan of Project site and buildings with notation of vantage points marked for location and direction of each photograph and video. Indicate elevation or story of construction. Include same label information as corresponding set of photographs or video.
- B. Photographs: Submit two prints of each photographic view
 - 1. Format: 8-by-10-inch smooth-surface matte prints on single-weight commercial-grade photographic paper, enclosed back to back in clear plastic sleeves that are punched for standard 3-ring binder.
 - 2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
 - a. Name of project.
 - b. Name of Architect and Construction Manager
 - c. Name of Contractor.
 - d. Date photograph was taken if not date stamped by camera.
 - e. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - f. Unique sequential identifier.
 - 3. Digital Images: Submit a complete set of digital image electronic files with each submittal of prints as a Project Record Document on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.
- C. DVD's: Submit 2 copies of each DVD with protective sleeve or case within seven days of recording.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name of Architect and Construction Manager.

- c. Name of Contractor.
- d. Date video was recorded.
- e. Description of vantage point, indicating location, direction (by encompass point), and elevation or story of construction.
- f. Weather conditions at time of recording.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Photographic Film: Medium format, 2-1/4 by 2-1/4 inches
- B. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1600 by 1200 pixels.
- C. Digital Video Recordings: Provide high-resolution, digital video disc in format acceptable to the Owner.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of photographs that identifies each photographic location.
- B. Film Images:
 - 1. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.
 - 2. Field Office Prints: Retain one set of prints of photographs in the field office at Project site, available at all times for reference.
- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and Time: Include date and time in filename for each image.
 - 2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference.
- D. Preconstruction Photographs: Before commencement of demolition, or starting construction, take color and digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.

1. Take 20 photographs of each existing building to accurately record physical conditions at start of demolition or construction.
2. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

3.2 CONSTRUCTION DIGITAL VIDEO

- A. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of construction. Display continuous running time and date. At start of each video, record weather conditions from local newspaper or television and the actual temperature reading at Project site.
- B. Narration: Describe scenes on video by audio narration by microphone while video is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
 1. Confirm date and time at beginning and end of recording.
 2. Begin each video with name of Project, Contractor's name, videographer's name, and Project location.
- C. Preconstruction Video: Before starting demolition or construction record video of Project site and surrounding properties from different vantage points.
 1. Show existing conditions adjacent to Project site before starting the Work.
 2. Show existing buildings either on or adjoining Project site to accurately record physical conditions at the start of demolition, or construction.
 3. Show protection efforts by Contractor.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 3. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 5. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.3 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

2. All submittals shall be submitted to Architect and Construction Manager within 25 days of contract signing.
 3. Allow sufficient processing time; as a minimum, as indicated in this Section.
 4. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include all submittals for the project in the initial submittal schedule.
 5. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 6. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.
- B. Architect will review Submittal Schedule for concentrations, overloading and similar conflicts which will impact the Architect's ability to meet the schedule and propose revisions to the duration of processing time to the Contractor.
- C. No payment will be made to Contractor until complete Schedule of Submittals has been received and accepted by Owner and Architect.
- D. 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 if the Contractor fails to submit a Submittal Schedule.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files:
1. Any request for digital data files shall be solely and exclusively for use related to this Project.
 2. CAD Background Drawings: Electronic copies of CAD Background Drawings of the Contract Documents in editable file format will be available from the Architect as a convenience to the Contractor for use in preparing shop drawings for this Project. Refer to "Contractor Request for Electronic Drawing Files" attached to the end of this Section for procedures for ordering and transfer of files and for Architect's limitations of liability for transfer.
 - a. CAD Background Drawings files requested will be delivered in editable file format indicated, and will not be further altered by the Architect prior to delivering them to any said party.
 3. Each contractor requesting electronic data file shall submit a request for Electronic Drawing Files, prior to delivery of said files. No contractor, shall transfer these

- Electronic Files received from the Architect, or any portion thereof to any third party (“Transferee”) without written permission of the Architect.
4. The Architect will transfer files to the requesting entity via the Project Information Management (PIM) software.
 5. All files are a schematic representation of elements within the project. All Contractors are responsible for field verification and coordination with other trades.
 6. Use of these files does not relieve the Contractor from producing Coordination Drawings and Shop Drawings required by the Contract.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Submit product data, shop drawings and samples relating to a complete assembly at one time. Partial submittals will be returned without action.
 5. Interrelated color selections will not be made until all pertinent samples are received by the Architect.
 6. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow sufficient time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect’s receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow a minimum of 15 working days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Resubmittal Review: Allow a minimum of 15 working days for review of each resubmittal.
 3. Sequential Review: Where sequential review of submittals by Architect’s consultants, Owner, or other parties is indicated, allow a minimum of 21 calendar days for initial review of each submittal. Any sequential reviews shall be identified on the Submittal Schedule by the Architect and agreed upon by the Project team.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Place fully executed “Submittal Cover Sheet” attached to the end of this Section as first page of every paper submittal. Complete all required information before

- submitting to Architect. Submittals received without Submittal Cover Sheet or with incomplete information on cover sheet will be returned for resubmission
3. Include Contractor's stamp indicating information complies with Contract Document requirements.
 4. Submittals indicating less than complete review by Contractor will be returned for Contractor's compliance without Architect's review.
 5. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 6. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form acceptable to Architect and Owner. Architect will return without review submittals received from sources other than Contractor.
 - a. Transmit all submittals to Architect with a copy to the Construction Manager unless otherwise indicated.
 - b. When submittal requires review of data by Structural Engineer or Mechanical or Electrical Engineers, submit a copy directly to such engineer with a copy to the Architect and the Construction Manager.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Place fully executed "Submittal Cover Sheet" attached to the end of this Section as first page of every electronic submittal. Complete all required information before submitting to Architect. Submittals received without Submittal Cover Sheet or with incomplete information on cover sheet will be returned for resubmission.
 3. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software or electronic form acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Specification Section number and title.
 - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - k. Drawing number and detail references, as appropriate.

- l. Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Indication of full or partial submittal.
 - o. Submittal and transmittal distribution record.
 - p. Other necessary identification.
 - q. Remarks.
- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and manner as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
 - 4. Architect's Re-review of Submittals: When resubmittals are required due to Contractor's failure to properly coordinate submittals, including coordination with other Prime Contractors, Contractor shall reimburse the Owner for fees paid to the Architect for re-review of submittals through a credit change order, in accordance with the Architect's current fee schedule.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.
 - 1. The Contractor shall perform no portion of its work requiring submittal and review of shop drawings, product data, samples or similar submittals until the respective submittal has been approved by the Architect. Such work shall be in accordance with approved submittals.
 - 2. The Contractor shall supply shop drawings to other Contractors engaged by the Owner to perform work in connection with the project to ensure proper coordination of its work with theirs.
 - 3. Do not proceed with installation until an applicable copy of the submittal is in the installer's possession.
 - 4. Do not permit use of unmarked copies of submittals in connection with construction.
- K. Project Information Management System: The submittal process will be implemented through the use of a digital processing and tracking software similar to "Submittal Exchange". Use this Project Information Management (PIM) software to transmit all submittals. Contractors must participate in and become capable in using this system.

1.5 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections. All submittals shall be submitted to Architect and Construction Manager within 25 days of contract signing.
1. Post electronic submittals as PDF electronic files directly to Architect's project information transmission web based software specifically established for Project.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 2. Action Submittals: Submit electronic file except where paper copies of submittals are specifically required.
 3. Informational Submittals: Submit electronic file except where paper copies of submittals are specifically required.
 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
 3. Mark each copy of each submittal to show which products and options are applicable. Strike extraneous information prior to submittal
 4. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 5. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 6. Submit Product Data before or concurrent with Samples.
 7. Submit Product Data in the following format:
 - a. PDF electronic file, unless requested by Architect.

- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted. Standard information prepared without specific reference to the Project is not considered a Shop Drawing. Verify field measurements prior to preparation of shop drawings.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file, unless requested by Architect.
 - b. In addition to submission of electronic files, submit 3 paper copies of fire alarm shop drawings and sprinkler shop drawings with Contractor approval stamps applied, for submittal to the AHJ Code Review for review and comment, as required.
 - c.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

- b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 - 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit three full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 - 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
 - 5. Submit product schedule in the following format:
 - a. PDF electronic file.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 013115 "Coordination Drawings."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Section 01 7823 "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research/Evaluation Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.

- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

1.6 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - EXECUTION

2.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 7700 "Closeout Procedures."

- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

2.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Architect's Actions:
 - 1. Contractor may proceed with fabrication on submittals marked "No Exception Taken" or "Make Corrections Noted" provided that the Contractor adheres to the corrections noted.
 - 2. Contractor may not proceed with fabrication on shop drawings noted "Revise and Resubmit" or "Rejected" until "No Exception Taken" or "Make Corrections Noted" stamp is received on resubmitted drawing.
 - 3. Contractor may not proceed with fabrication on the specific shop drawings noted "Partial Resubmit" until "No Exception Taken" or "Make Corrections Noted" stamp is received on resubmitted drawing.
 - 4. Do not permit submittals marked "Revise and Resubmit," or "Rejected," to be used at Project site, or elsewhere where Work is in progress.
 - 5. Other Action: Where submittal is primarily for information or record purposes, special processing or other activity, submittal will be returned, marked "No Action Taken."
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- F. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

ATTACHMENTS:

Submittal Cover Sheet
Contractor's Request for Electronic Drawing

SUBMITTAL COVER SHEET

Contractor: _____

Address: _____ Telephone: () _____

Owner: _____ Name of Project: _____
--

TYPE OF SUBMITTAL:

- | | | |
|---|--------------------------------------|--|
| <input type="checkbox"/> Shop Drawings | <input type="checkbox"/> Schedule | <input type="checkbox"/> Physical Sample |
| <input type="checkbox"/> Technical Data | <input type="checkbox"/> Certificate | <input type="checkbox"/> Color Sample |
| <input type="checkbox"/> Test Report | <input type="checkbox"/> Warranty | <input type="checkbox"/> _____ |

Submission #: (circle one) 1st 2nd 3rd 4th

<p>Description:</p> <p>Product Identification: _____ _____</p> <p>Manufacturer: _____</p> <p>Subcontractor/Supplier: _____</p> <p style="text-align: center;">DOCUMENT REFERENCES: (Must be fully filled out)</p> <p>Spec Section No.: _____ Drawing No(s): _____</p> <p>Paragraph: _____ Rm. Or Det. No(s): _____</p>

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

- | | |
|--|---|
| <input type="checkbox"/> NO EXCEPTIONS | <input type="checkbox"/> MAKE CORRECTIONS NOTED |
| <input type="checkbox"/> REJECTED | <input type="checkbox"/> REVISE AND RESUBMIT |
| <input type="checkbox"/> EXAMINED | <input type="checkbox"/> 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.

DATE _____ BY _____

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, are assumed by the Contractor/recipient. The 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 Attachment

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
 - 1. This Section does not include requirements for performing Special Inspections and Tests in compliance with Chapter 17 of the Building Code of New York State; refer to Section 014100.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Construction Manager or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Owner.
- C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
 - G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
 - H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
 - I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
 - J. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
 - 1. Mockups are used for one or more of the following:
 - a. Verify selections made under Sample submittals.
 - b. Demonstrate aesthetic effects.
 - c. Demonstrate the qualities of products and workmanship.
 - d. Demonstrate successful installation of interfaces between components and systems.
 - e. Perform preconstruction testing to determine system performance.
 - 2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
 - 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- 1.3 DELEGATED DESIGN SERVICES
- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
 - B. Delegated Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data For Contractor's quality-control personnel.
- B. Contractor's Statement of Responsibility: Submit copy of written statement of responsibility, acknowledging awareness of the special requirements contained in the Statement of Special Inspection, to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspection.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspection.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.6 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.

3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- 1.7 QUALITY ASSURANCE
- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

- B. **Manufacturer Qualifications:** A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. **Fabricator Qualifications:** A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Testing Agency Qualifications:** An NRTL, an NVLAP, an agency accredited by the International Accreditation Service, Inc. or an equivalent accreditation agency accrediting in accordance with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:

- a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, Construction Manager and Owner's Commissioning Authority, through Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
 3. Notify Architect and Construction Manager minimum seven days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
 - a. Allow minimum seven days for initial review and each re-review of each mockup.
 7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
 8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 10. Demolish and remove mockups when directed or incorporate approved in-place mock-ups in the finished work, as specifically instructed in each specification section where a mock-up is required.
- 1.8 QUALITY CONTROL
- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300 "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Construction Manager and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control 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.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Architect, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
- 1.9 SPECIAL INSPECTIONS
- A. Special Inspections: Owner will engage qualified testing agency(ies) and special inspectors to conduct special inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Division 01 Section "Special Inspections and Tests".

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Construction Manager's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014100 - 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 014100

ATTACHMENTS

SPECIAL INSPECTION NON-CONFORMANCE REPORT FORM

NYS ED 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:

Additions and Alterations at Meadow Pond Elementary School for
Katonah-Lewisboro School District

PART I: REFERENCE SPECIAL INSPECTION REPORT NO. _____.

(Attach copy of report.)

DESCRIPTION OF NON-CONFORMANCE:

RDP RESPONSE: (PROVIDE ATTACHMENTS IF NECESSARY)


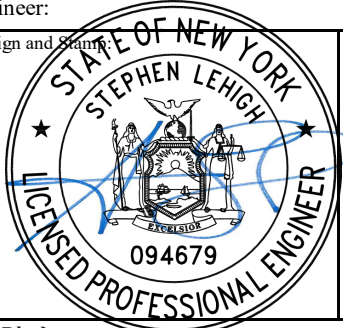
RDP SIGNATURE _____ DATE _____

IS REINSPECTION BY SPECIAL INSPECTOR REQUIRED YES NO

PART II: CONTRACTOR VERIFICATION (To be completed by either the **[General Contractor or Construction Manager]** or Subcontractor and returned to the Special Inspector and the RDP.)

I verify that as of the date listed, the non-conforming item noted above has been corrected as required.

SIGNATURE _____ DATE _____

 <p>NYS EDUCATION DEPARTMENT Office of Facilities Planning 89 Washington Avenue, Room 1060 EBA Albany, NY 12234</p>	<p>STATEMENT OF SPECIAL INSPECTIONS AND TESTS As required by the Building Code of NYS (2020 BCNYS) <i>Note: The code listings below are not to be considered all inclusive.</i></p>	
<p>BCNYS § 1704.2.3 requires the NYS Licensed Design Professional (of record) to complete the Statement of Special Inspections and Tests. Completion of the Statement of Special Inspections & Tests, and; Submission to the Office of Facilities Planning with the Construction Permit Application is a condition for issuance of the Building Permit.</p>		
School District Katonah-Lewisboro School District	Project Title Additions and Alterations at Meadow Pond ES	
Building Meadow Pond Elementary School		
SED Project # 660101-03-0007-016	Project Address 185 Smith Ridge Road, South Salem, NY 10590	
Architect/Engineer: Stephen Lehigh, P.E.		
Sign and Stamp 	Exp. 9/30/2026	
A/E Firm (or Dba): The Di Salvo Engineering Group	Phone 203-490-4140	Date 8/29/2023
Comments:		

INSPECTION AND TESTING Continuous & Periodic as is Defined by the BCNYS CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
A. Steel Construction Ch. 22						
1. Material verification of high-strength bolts, nuts and washers.		x	AISC 360	1705.2 2204	<input checked="" type="checkbox"/>	051200
2. Inspection of high-strength bolting.	x	x	AISC 360 ACI 318	1705.2 2204.2	<input checked="" type="checkbox"/>	
3. Material verification of Structural Steel. Open Web Steel Joist and Girders. Basic protection of steel members, Seismic Resistance			AISC 360 ASTM A6, A514, A29 SJ100, 200 AISC 341	1705.2 2203, 2205 1705.2 2207	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
4. Spray Applied Fire Resistant Materials & Specialized Finishes			ASTM E605, E736	1705.14 1705.15	<input type="checkbox"/>	
5. Cold Formed Steel Construction- load bearing. Seismic Resistance			AISI S100, S220, S240 ANSI/SDI -NC1.0, RD1.0, SDI-C, ASCE 7, 8 AISI S400	1704.2.5 2210 2211	<input checked="" type="checkbox"/> <input type="checkbox"/>	054000 - All Cold Formed Steel Construction to be Inspected
6. Material verification of weld filler materials.			AWS D1.1, D1.3	1705.2 2204.1	<input checked="" type="checkbox"/>	
7. Inspection of welding:			ACI 318: 26.6.4	T 1705.3 2204	<input checked="" type="checkbox"/>	
a. Structural steel	x	x	AWS D1.1, D1.3	1705.2	<input checked="" type="checkbox"/>	
b. Reinforcing steel	x	x	AWS D1.1, D1.3	1705.3.1	<input type="checkbox"/>	
c. Cold Formed Steel Deck			AISC S100, ASCE 7, 8	1705.2.2	<input type="checkbox"/>	
8. Inspection of steel frame joint details.		x		1705.2	<input type="checkbox"/>	

INSPECTION AND TESTING Continuous & Periodic as Defined by the BCNYS CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.		CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
B. Concrete Construction		Ch. 19					
1.	Inspection of reinforcing steel, including prestressing tendons, and verify placement.		X	Ch. 21, 22 ACI 318; Ch 20, 25.2, 25.3, 26.6.1, 26.6.3 AISC 360	T 1705.3 1901 1905	<input checked="" type="checkbox"/>	033000
2.	Inspection of reinforcing steel bar welding.			ACI 318, AWS D1.4	T 1705.3	<input type="checkbox"/>	Not Permitted
3.	Inspection of anchors to be installed in concrete prior to and during placement.	X		ACI 318: 17.8.2, 17.8.2.4	T 1705.3	<input type="checkbox"/>	
4.	Verify use of required design mix.		X	ACI 318: Ch. 19, 26.4.3, 26.4.4	T 1705.3 1904 1908	<input checked="" type="checkbox"/>	
5.	Sampling fresh concrete: slump, air content, temperature, strength test specimens.	X		ASTM C172, C31 ACI 318: 26.5, 26.9, 26.10, 26.11	T 1705.3 1901 1905 1908	<input checked="" type="checkbox"/>	
6.	Inspection of placement for proper application techniques.	X		ACI 318: 26.5	T 1705.3	<input checked="" type="checkbox"/>	
7.	Inspection for maintenance of specified curing temperature and techniques.		X	ACI 318: 26.5	T 1705.3 1908 1909	<input checked="" type="checkbox"/>	
8.	Inspection of prestressed concrete.	X		ACI 318: 26.10	T 1705.3	<input type="checkbox"/>	
9.	Erection of precast concrete members.		X	ACI 318: 26.9	T 1705.3	<input type="checkbox"/>	
10.	Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.		X	ACI 318: 26.11.2	T 1705.3	<input type="checkbox"/>	
11	Inspection of formwork		X	ACI 318: 26.11.1.2 (b)	T 1705.3	<input checked="" type="checkbox"/>	

C. Masonry Construction					Ch. 21		
INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.	CONTINUOUS	PERIODIC	REFERENCE STANDARD		BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
<p>L1 = Level 1 Inspection required for nonessential facilities.</p> <p>L2 = Level 2 Inspection required for essential facilities.</p> <p>* In general, schools are not considered essential facilities unless they are a designated emergency shelter.</p>			ASTM E119 UL 263 ASTM C1364 ASTM C1670 ASTM A706 ASCE 7, 8	TMS 402, 403, 404, 504, 602	1705.4 2101 1604		
1. <u>Verify to ensure compliance:</u>							
a. Proportions of site prepared mortar and grout.		X L1 & L2			1705.4 2103.2	<input type="checkbox"/>	
b. Placement of masonry units and construction of mortar joints.		X L1 & L2			1705.4 T 1705.3	<input type="checkbox"/>	
c. Location and placement of reinforcement, connectors, tendons, anchorages.		X L1 & L2			1705.45 2103.4 T 1705.3	<input type="checkbox"/>	
d. Prestressing technique.		X L1			1705.4	<input type="checkbox"/>	
Grout space prior to grouting.	X L2				1705.4	<input type="checkbox"/>	
e. Grade and size of prestressing tendons and anchorages.		X L1			1705.4	<input type="checkbox"/>	
Placement of grout.	X L2				1705.4	<input type="checkbox"/>	
f. Grout specs prior to grouting.	X L2				1705.4	<input type="checkbox"/>	
2. <u>Inspection program shall verify:</u>							
a. Size and location of structural elements.		X L1 & L2			1704.5 1705.4	<input type="checkbox"/>	
b. Type, size, and location of anchors.	X L2	X L1			1705.4 T 1705.3	<input type="checkbox"/>	
c. Specified size, grade, and type of reinforcement.		X L1 & L2			1704.5	<input type="checkbox"/>	
d. Welding of reinforcing bars.	X L1 & L2				1704.5	<input type="checkbox"/>	
e. Cold/hot weather protection of masonry construction.		X L1 & L2			1704.5, 2104.3, 2104.4	<input type="checkbox"/>	
f. Prestressing force measurement and application.	X L2	X L1			1704.5	<input type="checkbox"/>	
3. <u>Verification accessory placement prior to grouting:</u>	X L2	X L1			1704.5, 2105.2.2, 2105.3	<input type="checkbox"/>	
4. Grout placement.	X L1				1704.5	<input type="checkbox"/>	
5. Preparation of grout specimens, mortar specimens, and/or prisms.	X L1 & L2				1704.5, 2105.2.2, 2105.3	<input type="checkbox"/>	
6. Compliance with documents and submittals.		X L1 & L2			1704.5	<input type="checkbox"/>	

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
D. Wood Construction Ch. 23						
1. Fabrication process of prefabricated Wood Structural Elements and assemblies.		X	Ch. 16 AWC, APA, CPA, DOC PS1, PS2	1704.6, 1705.5 2302, 2303 2304	<input type="checkbox"/>	
2. High-load diaphragms Seismic Resistance		X		1704, 1705, 1704.6 2304, 2305 2306, 2307, 2308	<input type="checkbox"/>	
E. Soils Ch. 18						
1. Geotechnical Investigations, Excavations, Grading, Fill Damp-proofing/ Water-Proofing		X	ASTM, NYS DOT OSHA Appendix J- BCNYS	1704, 1706 1803, 1804, 1805	<input checked="" type="checkbox"/>	
2. Flood & Stormwater Hazards [per BCNYS 106]		X	<u>Local Highway Authority</u> <u>Flood Plain Admin.</u> Appendix G- BCNYS	1703 1610, 1611, 1612 1805.1.2.1	<input type="checkbox"/> <input type="checkbox"/>	
F. Specialized Foundations- Piers, Piles Ch. 16						
1. Deep Foundation Elements: Driven Piles Cast in Place Helical Piles		X		T 1705.7 T 1705.8 1705.7 1705.8 1705.9	<input type="checkbox"/>	
G. Exterior Wall Coverings Ch. 14						
1. Exterior Insulation and Finish Systems (EIFS) MCM, HPL, Other Combustible Materials		X	ASTM E2568, E2273, E2570 E2393, E84 Ch. 16 NFPA 268, 275, 285, 286	1405, 1406, 1407, 1408 1704.2, 1705.12.5 1705.16	<input type="checkbox"/>	
H. Misc.						
1. Access Floors and Storage Racks Other Architectural, MEP Components Seismic Resistance		X		1705.12	<input type="checkbox"/>	
2. In-Situ Testing		X		1604.6, 1708	<input type="checkbox"/>	
3. Pre-Construction Load Testing		X		1604.7, 1709	<input type="checkbox"/>	
4. Fire Resistant Penetrations & Joints Fire Stops Testing for Smoke Control		X	Ch. 7 ASTM E119 UL 263	1705.17 1705.18	<input type="checkbox"/>	
5. Pre-Submission: Inventory of all Fire-Resistant-Rated Construction- Level 2 Alterations and greater [per BCNYS 106]	X		verification required EBCNYS Ch. 3 C. of E. 155 Regulations.	FCNYS 701.6 BCNYS 703.7 19CRR-NY XXXII	<input type="checkbox"/>	
6. Pre-Submission: Hazardous Material Survey Water Quality Survey	X X		verification required <u>ACM Letter- Certificate</u> C. of E. 155 Regulations.	US-EPA NYS-DOH	<input type="checkbox"/>	
7. Other:					<input type="checkbox"/>	

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Refer to Drawing LP-1 and LP-2 for additional requirements.

1.2 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, Construction Manager, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
 - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
 - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

- D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
1. HVAC system isolation schematic drawing.
 2. Location of proposed air-filtration system discharge.
 3. Waste handling procedures.
 4. Other dust-control measures.

1.4 QUALITY ASSURANCE

- A. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- B. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).
- C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Project Meeting Space: Project progress meetings will be held in the building at a location determined by the Owner.
1. Due to space limitations, Contractors will not be permitted to have field office trailers on the site.
- B. Storage and Fabrication Sheds: Due to space limitations, Contractors will not be permitted to have field storage trailers on the site. Storage areas will be provided inside of the school for the summer work period.
1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

- B. Air-Filtration Units: General Contractor shall provide primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to existing system.
- C. Water Service: Connect to Owner's existing water service source. Install water service distribution piping in sizes and pressures adequate for construction. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Sanitary Facilities: General Contractor shall provide temporary toilets, wash facilities, and drinking water for use of all Prime Contractors' construction personnel, including all paper supplies and service for these toilets. Provide one toilet per 10 people with a minimum of 4 toilets. All toilets shall be cleaned once a week. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Toilets: Use of Owner's existing toilet facilities will not be permitted
- E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.

- b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- F. Electric Power Service: Connect temporary distribution cords to Owner's existing power source, as directed by Owner. Provide electric power service distribution system of sufficient size, capacity, and power characteristics required for construction operations.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- H. Telephone Service: Provide cell phone service for Contractor's Superintendent. Cost shall be borne by Contractor.
- I. Electronic Communication Service:
1. Internet Service: Contractor may only connect to the Owner's data network if expressly permitted by Owner. Cost of the connection shall be borne by the Contractor.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Parking: Contractors' construction personnel may park in Owner designated areas of existing parking lots during the summer when school is not in session. Arrangements for parking will be made by Construction Manager and Director of Facilities for the times when school is in session.

- C. Temporary Use of Permanent Roads and Paved Areas: Limit use of existing roads on school campus to those designated by Owner as assigned construction route. Maintain roads in clean dust-free and dirt-free condition; clean roads of mud and debris caused by construction traffic.
- D. Traffic Controls: Provide traffic control signage of type approved by Owner to direct traffic at and around construction site. Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Temporary Signs: Provide signs as indicated and as required to inform public and individuals seeking entrance to Project
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 2. Maintain and touchup signs so they are legible at all times
- G. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
 - 1. General Contractor shall provide dumpsters for the use of all contractors.
 - 2. Each Prime Contractor shall place their debris daily into the dumpsters provided by the General Contractor.
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Temporary Elevator Use: N/A.
- J. Temporary Use of Permanent Stairs: N/A
- K. Scaffolding: Scaffolding: Provide scaffolding systems and/or lifts as required for the performance of the Work. Scaffolding shall be designed by a NYS licensed Professional Engineer and signed and sealed drawings of scaffolding shall be submitted for Architect's and Construction Manager's information. Scaffolding shall be designed so as to not cause damage to the building.

- L. Cranes: All crane picks, material delivery, etc. must be coordinated so as not to lift over any occupied area of the building. If necessary, this work shall be done on off hours to ensure the safety of the building occupants. Crane location must be carefully chosen to ensure the safety of building occupants. Crane picks cannot be conducted during academic hours within 30' of an occupied building.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of Erosion and Sediment Control Drawings and specification in Division 31.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- A. Site Enclosure Fence: Before construction operations begin, General Contractor shall furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations and around all staging and temporary lay-down areas.
 - 2. Fences shall be 6 ft tall chain link fencing, with gates, and have wind screening on one side.

3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Construction Manager and Owner
- B. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- D. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
 2. Provide weatherproof, secure temporary enclosures for all window openings where windows have been removed.
- F. Temporary Partitions: General Contractor shall provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise. Provide types of partitions approved by Owner in Owner occupied areas.
 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
 2. In areas where containment of airborne particles is critical to Owner operations, construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
 - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - a. Temporary partitions shall comply with NFPA 241
 4. Insulate partitions to control noise transmission to occupied areas.

5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 6. Protect air-handling equipment.
 7. Provide walk-off mats at each entrance through temporary partition.
- G. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with Owner and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been 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 temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor.
 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 015719 - ENVIRONMENTAL PROTECTION DURING CONSTRUCTION

PART 1 - GENERAL

1.1 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

1.2 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.

1.3 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.

1.4 NOTIFICATION

- A. The Construction Manager 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 Construction Manager 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.

1.5 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 Construction Manager.

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 Construction Manager.

- 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.

1.6 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 Construction Manager so that the proper authorities may be notified.

1.7 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 Construction Manager 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 Construction Manager. 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 Construction Manager, refilled with clean material and compacted all at the expense of the Contractor.

1.8 BURNING

- A. Burning will not be permitted.

1.9 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 Construction Manager. 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.

1.10 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 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for products selected under an alternate.
 - 2. Section 012500 "Substitution Procedures" for requests for substitutions.
 - 3. Section 014200 "References" for applicable industry standards for products specified.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Mechanical Materials and Equipment: 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. Provide products which are compatible within systems and other connected items.
- C. Asbestos in Materials: All products submitted for use and incorporated into this project shall be asbestos free.
- D. Mercury-Free Products: All products submitted for use and incorporated into this Project shall be mercury-free. In the absence of mercury-free products, provide products with the lowest amount of mercury possible.
- E. Lead-Free Products: All products submitted for use and incorporated into this Project shall be lead-free. .

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. **Manufacturer's Warranty:** Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner.

B. **Special Warranties:** Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. **Manufacturer's Standard Form:** Modified to include Project-specific information and properly executed.
2. **Specified Form:** When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

- C. Submittal Time: Comply with requirements in Section 017700 "Project Closeout."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
7. A named product and model number establishes the characteristics and salient features of the specifications even when they are not fully described and will serve as the basis of comparison.
8. Whenever a material, article, device, piece of equipment or type of construction is identified by reference to manufacturers' or vendors' names, trade names, catalog numbers, or similar specific information, it is so identified for the purpose of establishing a standard of quality, and such identification shall not be construed as limiting competition. Comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product

- B. Product Selection Procedures:

1. Named Product: Where Specifications name a single manufacturer and product, and "no substitutions" is indicated, provide the named product. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Named Manufacturer/Source: Where Specifications name a single manufacturer or source and "no substitutions" is indicated, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with

requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Evidence that the proposed product provides sustainable design characteristics that specified product provides for achieving LEED prerequisites and credits.
 3. Evidence that the proposed product will not adversely affect Contractor's construction schedule.
 4. Evidence that the proposed product has received necessary approvals of authorities having jurisdiction.
 5. Evidence that the proposed product will have no adverse effect on other trades and will not affect or delay progress schedule; or if proposed product involves more than one contractor, proposed product has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
 6. Evidence that the proposed product maintenance service and source of replacement parts, as applicable, is available similar to the specified product.
 7. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 8. Evidence that proposed product provides specified warranty.
 9. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

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Issued for Bid

Katonah-Lewisboro Union Free School District
Additions and Alterations to Meadow Pond Elementary School
SED No. 66-01-01-03-0-007-016

10. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.

- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.
 - 2. Section 013300 "Submittal Procedures" for submitting surveys.
 - 3. Section 017329 "Cutting and Patching" for cutting and patching portions of the building.
 - 4. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.

- A. Final As-Built Survey of Underground Utilities: Submit two paper copies and one electronic (.pdf) file, signed by land surveyor.

1.3 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services:
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- D. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- E. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and/or Owner as required, that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are

indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish limits on use of Project site.
 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 4. Inform installers of lines and levels to which they must comply.
 5. Check the location, level and plumb, of every major element as the Work progresses.
 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.

- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Final Survey for Underground Utilities: Engage a land surveyor to prepare a final survey of all utilities installed during the project, including all elevations and inverts.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces without ceilings.
- B. Mechanical Installations: Comply with the following requirements:
 - 1. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 - 2. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
 - 3. Install all equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
- C. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- D. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- E. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- F. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- G. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

- H. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- I. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. 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.
- J. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- K. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

- A. General: Clean Project site, public pedestrian paths and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended,

use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017329 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes procedural requirements for cutting and patching.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.
 - 2. Section 024119 "Selective Structure Removal and Demolition" for demolition of selected portions of the site for alterations.
 - 3. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.
- C. Coordinate cutting and patching requirements with selective demolition. Removal of portions of existing construction required for the installation or performance of other work may be indicated as selective demolition on the demolition drawings. Cut and patch all construction when not shown on the demolition drawings, or when additional cutting and patching is required after the completion of selective demolition.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.3 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

1.4 QUALITY ASSURANCE

- A. Minimize cutting and patching of work by properly coordinating construction sequences with Construction Manager.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
 - 1. Cutting and Patching of Existing Roofing System: Contractors performing cutting and patching of the existing roof membrane shall be certified installers by the existing roof membrane manufacturer for their products. When existing roofing system is still under warranty, coordinate all work on the existing roofing system with manufacturer. All cutting and patching work on roofing system shall be performed in a manner that does not void the warranty.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 1000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.

1.2 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 15 days of date established for commencement of the Work.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

1.6 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, and waste reduction work plan. Distinguish between demolition and construction waste.
- B. Waste Identification: Indicate anticipated types of demolition and construction waste generated by the Work.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1. Construction Waste:

- a. Packaging: Salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Wood pallets.
 - 8) Plastic pails.
- b. Construction Office Waste: Salvage or recycle 100 percent of the following construction office waste materials:

- 1) Paper.
- 2) Aluminum cans.
- 3) Glass containers.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
 2. Review waste management procedures with all entities when they first begin work on-site, including locations established for salvage, recycling, and disposal.
- B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.

- B. Related Requirements:
 - 1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
 - 2. Section 017300 "Execution" for progress cleaning of Project site.
 - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 5. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.2 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

- B. Attic stock in the required amount/percentage shall be turned over to the Owner immediately after the first delivery of the material is received on the site, not at the end of the project.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
 - 5. Submit test/adjust/balance records.
 - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - 7. Submit fully executed Certification of Drawings and Specification Compliance form included at the end of this Section.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 3. Complete startup and testing of systems and equipment.

4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Architect will perform inspection in areas no smaller than a floor plate. Inspection of individual rooms or spaces will not be performed.
2. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - a. Reinspection Limits: The Architect and Construction Manager are limited to performing the original inspection and two reinspections of the same area as part of their services. The cost of any reinspections required beyond this amount will be borne by the Contractor. Contractor shall reimburse Owner for reinspection fees paid to the Architect and/or Construction Manager through a credit change order in the amount stipulated by the Owner
3. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
3. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

a. Reinspection Limits: The Architect and Construction Manager are limited to performing the original inspection and two reinspections of the same area as part of their services. The cost of any reinspections required beyond this amount will be borne by the Contractor. Contractor shall reimburse Owner for reinspection fees paid to the Architect and/or Construction Manager through a credit change order in the amount stipulated by the Owner

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.

2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Include the following information at the top of each page:

- a. Project name.
- b. Date.
- c. Name of Architect.
- d. Name of Contractor.
- e. Page number.

4. Submit list of incomplete items in the following format:

a. MS Excel electronic file. Architect will return annotated file.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

- a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

Attachment: Certification of Drawing and Specification Compliance form

CERTIFICATION OF DRAWING AND SPECIFICATION COMPLIANCE

The Undersigned Prime Contractor does herein certify that:

1. All materials furnished for this 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 Contract Document drawings.

CONTRACT NUMBER AND CONTRACT NAME: _____

NAME OF CONTRACTOR: _____

CERTIFICATION BY: _____ TITLE: _____

ADDRESS: _____

DATED: _____

CORPORATE ACKNOWLEDGEMENT

)SS.
)

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 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.2 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file complete with Table of Contents and book marked by equipment. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 60 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 30 days before commencing demonstration and training. Architect will return copy with comments.
 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
 1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of

equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Name and contact information for Commissioning Authority.
8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
9. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.

6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.

2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 1. Standard maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

22 March 2024
Issued for Bid

Katonah-Lewisboro Union Free School District
Additions and Alterations to Meadow Pond Elementary School
SED No. 66-01-01-03-0-007-016

1. Do not use original project record documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous Record Submittals.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for final property survey.
 - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
 - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Submit PDF electronic files of scanned record prints and one set of prints.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record ("As- Built") Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Field Order.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

7. Format: Submit PDF electronic files of scanned record prints and one set of prints.
 - a. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - b. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 - c. Identification: As follows:
 - 1) Project name.
 - 2) Date.
 - 3) Designation "PROJECT RECORD DRAWINGS."
 - 4) Name of Architect
 - 5) Name of Contractor.

B. Record Digital Data Files: In addition to submitting paper Record Drawings, transfer information to electronic CAD drawings in .DXF format and prepare set of digital record drawings. Architect will supply a set of base electronic drawings for Contractor's use. Submit electronic Record Drawings to Owner in same manner as paper Record Drawings.

C. The following certification shall appear on all Record Drawings: "These record drawings prepared by _____ for the following work _____ have been reviewed by the undersigned and appear to be an accurate representation of the work incorporated within the project and are accepted as submitted in accordance with the technical documents. This record document review made by this office is for determination of compliance with the requirements of the contract documents.

Firm Name: _____ Date: _____ Reviewer Name: _____ I

D. If the Construction Manager or Architect determines the Record Drawings are not complete or contain inaccurate information, they will return the documents to the Contractor for correction and resubmission.

E. Final payment will not be made to Contractor until complete and accurate Record Drawings both on paper and electronic media have been received and accepted by Owner.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and record Drawings where applicable.

- B. Format: Submit record Specifications as scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

- B. Format: Submit record Product Data as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

- B. Format: Submit miscellaneous record submittals as PDF electronic file or scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

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- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and Construction Manager's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training video recordings.

1.2 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.
- C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date of video recording.

1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

- B. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor has delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.

- e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
 6. Troubleshooting: Include the following:

- a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Owner will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 1. Schedule training with Owner, through Architect, with at least seven days' advance notice.
- C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

- D. Provide operating and maintenance instruction to Owner's personnel for systems and components as indicated in individual Specification Sections. Provide instruction periods, comprised of approximately 50 percent classroom instruction and 50 percent "hands-on" instruction.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids.
- B. Video: Provide minimum 640 x 480 video resolution converted to .mp4 format file type, on electronic media.
 - 1. Electronic Media: CD ROM or thumb drive, with computer made label.
 - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
 - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
 - 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
 - a. Name of Contractor/Installer.
 - b. Business address.
 - c. Business phone number.
 - d. Point of contact.
 - e. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
 - 1. Film training session(s) in segments not to exceed 15 minutes.
 - 2. Produce segments to present a single significant piece of equipment per segment.
 - 3. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
 - 4. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording. Furnish additional portable lighting as required.
- E. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

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END OF SECTION 017900

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of a building or structure.
2. Salvage of selected building components and elements.
3. Repair procedures for selective demolition operations.

B. Related Sections include the following:

1. Division 01 General Requirements for temporary construction and environmental-protection measures for selective demolition operations.
2. Division 01 General Requirements for cutting and patching procedures for selective demolition operations.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.4 SUBMITTALS

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

- B. Proposed Dust-Control, Noise-Control and Other Special Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
- D. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- E. Predemolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

1.5 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Professional Engineer Qualifications: Comply with Division 01 General Requirements.
- C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.
- E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 General Requirements.

1.6 PROJECT CONDITIONS

- A. Owner will occupy portions of site and buildings immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 2 weeks' notice to Owner of activities that will affect Owner's operations.
- B. Owner may elect to salvage certain items from areas of construction other than those indicated on Drawings as "salvage" prior to selective demolition operations. Give 2 weeks notice to Owner prior to commencing any selective demolition processes to allow for Owner salvage operations.

- C. Maintain access to existing walkways, roadways, and other adjacent occupied or used facilities.
 - 1. Do not close or obstruct walkways, roadways, or other occupied or used facilities without written permission from authorities having jurisdiction.
- D. Owner assumes no responsibility for condition of areas to be selectively demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- E. Hazardous Materials: Remediation of existing hazardous materials, if any, will be completed prior to commencement of selective demolition in the areas where hazardous materials are present.
 - 1. If materials suspected of containing hazardous materials that have not been previously identified in the Contract Documents are encountered, do not disturb; immediately notify Architect and Owner.
 - 2. A hazardous materials report is included in the Specifications for information only.
- F. Storage or sale of removed items or materials on-site will not be permitted.
- G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
- H. Cutting and Patching of Existing Roofing System: Contractors performing cutting and patching of the existing roof membrane shall be certified installers by the existing roof membrane manufacturer for their products. When existing roofing system is still under warranty, coordinate all work on the existing roofing system with manufacturer. All cutting and patching work on roofing system shall be performed in a manner that does not void the warranty.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 - 1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 2. Use materials whose installed performance equals or surpasses that of existing materials.
- B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.
- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
 - 1. Provide at least 2 weeks' notice to Owner if shutdown of service is required during changeover.
- C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
 - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - 4. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
 - 2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
- C. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent site improvements, structures and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Provide special protection measures as required by Owner.
- D. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects
- E. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- F. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.

3.4 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
 - 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.5 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 9. Dispose of demolished items and materials promptly.
 - 10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- B. Removed and Salvaged Items: Comply with the following:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items: Comply with the following:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Salvage items indicated on the Drawings as "salvage".

E. Existing Facilities: Comply with Owner's requirements for using and protecting elevators, stairs, walkways, building entries, and other building facilities during selective demolition operations.

F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

G. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.

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

I. Brick Masonry and Cast Stone to be Salvaged: Carefully dismantle brick veneer and cast stone trim at exterior walls where demolition is indicated. Salvage existing removed brick and cast stone for reuse. Remove mortar, anchors, and ties from brick masonry and cast stone. Clean and stack undamaged, whole brick masonry and cast stone units on wood pallets and provide weatherproof covering. Locate stored brick and cast stone where directed by Architect.

J. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

K. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

3.6 PATCHING AND REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.
- B. Patching: Comply with Division 01 Section "Cutting and Patching."
- C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
 - 1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.
- D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
- E. Floors and Walls: Where walls or partitions that are demolished extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - 2. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
 - 3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
- F. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 024119

SECTION 028200 - ASBESTOS REMOVAL

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This asbestos abatement Project will consist of the removal and disposal of asbestos containing materials (ACM) and presumed asbestos containing materials (PACM) at the:

1. Meadow Pond Elementary School - 185 Smith Ridge Road, South Salem, New York 10590

B. The work shall include but not be limited to the removal of the following materials:

1. Remove & dispose of floor tiles as ACM. Typ. for 21,000 sq. ft. of surface area of tile.
2. Remove & dispose 2 layers of floor tile as ACM. Typ. for 3,500 sq. ft. of surface area of tile.
3. Remove & dispose of existing wall bottom track as ACM. Remove & dispose of remaining drywall & framing as general construction debris. 80 lin. ft. of wall.
4. Abatement contractor shall include in their bid the cost to remove and dispose of mudded fitting where new piping attaches to existing or is being removed. Coordinate scope with plumbing trade contractor. Typ. for 25 fittings.

All as indicated on the drawings and as contained within the Limited Renovation Survey for Asbestos Containing Materials, Lead Based Paint & PCB's attached as Appendix 'A' to the end of this section.

C. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.

D. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.

E. Working hours shall be as required and approved by the Owner. Asbestos abatement activities including, but not limited to, work area preparation, gross removal activities, cleaning activities, waste removal, etc. may need to be performed during 'off-hours' (including nights and weekends). In addition, multiple mobilizations may be required to perform the work identified in this project. The Contractor shall coordinate and schedule all Work with the facility and Owner's representative.

1.2 SPECIAL JOB CONDITIONS

- A. All final air clearances associated with this project must be run by TEM, as described in 40 CFR Part 763 Asbestos, Subpart E, 763.90 and as per New York State Education Department Requirements.
- B. All above ceiling debris removal decontamination work shall be performed in accordance with the NYS DOL approved site specific variance attached to the end of this section.=

1.3 PERMITS AND COMPLIANCE

- A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.
- B. Perform asbestos related Work in accordance with New York State Industrial Code Rule 56 (herein referred to as Code Rule 56), 40 CFR 61, and 29 CFR 1926. Where more stringent requirements are specified, adhere to the more stringent requirements.
- C. The Contractor must maintain current licenses, permits and certifications pursuant to New York State Department of Labor and Department of Environmental Conservation for all Work related to this Project, including the removal, handling, transport, and disposal of asbestos containing materials.
- D. The Contractor must have and submit proof upon request that any persons employed by the Contractor to engage in or supervise Work on any asbestos Project have a valid NYS asbestos handling certificate pursuant to Code Rule 56.
- E. The Contractor shall comply fully with any Variance secured from regulatory agencies by the Owner in the performance of the Work. Any Variance applications previously submitted are included as an appendix of this specification.
- F. The Contractor shall be responsible for obtaining all Variances as may be required for the Project or as requested by the Owner. Approval of the Owner is required prior to submission of a Variance application to any regulatory agency. Failure to obtain Owner approval may result in Owner not permitting variance to be used on the project.
- G. The Contractor shall be responsible for compliance with The New York State Uniform Fire Prevention and Building Code, or its successor during all Work at the site.
- H. Failure to adhere to the Project Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided, however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

1.4 SUBMITTALS

- A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below, with 1 copy going directly to the Owner for review and approval prior to the commencement of asbestos abatement activities:

1. Contractor license issued by New York State Department of Labor.
 2. A list of Projects performed within the past two (2) years including the dollar value of all Projects. Provide Project references to include Owner, consultant, and air monitoring firm's name, contact persons, address, and phone number.
 3. Progress Schedule:
 - a. Show the complete sequence of abatement activities and the sequencing of Work within each building or building section.
 - b. Show the dates for the beginning and completion of each major element of Work including substantial completion dates for each Work Area, building, or phase.
 4. Project Notifications: As required by Federal and State regulatory agencies together with proof of transmittal (i.e. certified mail return receipt).
 5. Building Occupant Notification: As required by regulatory agencies.
 6. Abatement Work Plan: Provide plans that clearly indicate the following:
 - a. All Work Areas/containments numbered sequentially.
 - b. Locations and types of all decontamination enclosures.
 - c. Entrances and exits to the Work Areas/containments.
 - d. Type of abatement activity/technique for each Work Area/containment.
 - e. Number and location of negative air units and exhaust. Also provide calculations for determining number of negative air pressure units.
 - f. Location of water and electrical connections to building services.
 - g. Waste transport routes through the building to the waste storage container.
 7. Disposal Site/Landfill Permit from applicable regulatory agency.
 8. NYS Department of Environmental Conservation Waste Transporter Permit.
- B. On-Site Submittals: Refer to Part 3.1.C & D for all submittals, documentation, and postings required to be maintained on-site during abatement activities.
- C. Project Close-out Submittals: Within 30 days of the completion of each abatement phase, the Contractor shall submit one copy of the documents listed below to Owner and one copy to the environmental consultant for review and approval prior to Contractor's final payment. Once Owner approves the close-out submittal, the Contractor shall provide three sets of the approved close-out documents (double-sided and bound) to Owner Project Management, including one set to be distributed to the facility.
1. All waste disposal manifests and disposal logs
 2. OSHA compliance air monitoring records conducted during the Work.
 3. Daily progress log, including the entry/exit log.
 4. Provide the Contractor's Acknowledgement Statement that lists all Workers used in the performance of the Project, including name and NYS DOL certification number. The Statement shall be notarized (Original notarized statement shall be sent to Owner).
 5. Disposal Site/Landfill Permit from applicable regulatory agency.
 6. Project notifications, amended notifications, Variances.
- 1.5 PRE-CONSTRUCTION CONFERENCE
- A. Prior to start of preparatory Work under this Contract, the Contractor shall attend a pre-construction conference attended by Owner, Facility Personnel, and Environmental Consultant.

- B. Agenda for this conference shall include but not necessarily be limited to:
1. Contractor's scope of Work, Work plan, and schedule to include number of workers and shifts.
 2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.
 3. Environmental Consultant's duties, functions, and authority.
 4. Contractor's Work procedures including:
 - a. Methods of job site preparation and removal methods.
 - b. Respiratory protection.
 - c. Disposal procedures.
 - d. Cleanup procedures.
 - e. Fire exits and emergency procedures.
 5. Contractor's required pre-work and on-site submittals, documentation, and postings.
 6. Contractor's plan for twenty-four (24) hour Project security both for prevention of theft and for barring entry of unauthorized personnel into Work Areas.
 7. Temporary utilities.
 8. Handling of furniture and other moveable objects.
 9. Storage of removed asbestos containing materials.
 10. Waste disposal requirements and procedures, including use of the Owner supplied waste manifest.
- C. In conjunction with the conference the Contractor shall accompany the Owner and Environmental Consultant on a pre-construction walk-through documenting existing condition of finishes and furnishings, reviewing overall Work plan, location of fire exits, fire protection equipment, water supply and temporary electric tie-in.

1.6 APPLICABLE STANDARDS AND REGULATIONS

- A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:
- B. Federal Regulations:
1. 29 CFR 1910.1001, "Asbestos" (OSHA)
 2. 29 CFR 1910.1200, "Hazard Communication" (OSHA)
 3. 29 CFR 1910.134, "Respiratory Protection" (OSHA)
 4. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)
 5. 29 CFR 1926, "Construction Industry" (OSHA)
 6. 29 CFR 1926.1101, "Asbestos, Tremolite, Anthophyllite, and Actinolite" (OSHA)
 7. 29 CFR 1926.500 "Guardrails, Handrails and Covers" (OSHA)
 8. 40 CFR 61, Subpart A, "General Provisions" (EPA)
 9. 40 CFR 61, Subpart M, "National Emission Standard for Asbestos" (EPA)
 10. 49 CFR 171-172, Transportation Standards (DOT)
- C. New York State Regulations:
1. 12 NYCRR, Part 56, "Asbestos", Industrial Code Rule 56 (DOL)
 2. 6 NYCRR, Parts 360, 364, Disposal and Transportation (DEC)
 3. 10 NYCRR, Part 73, "Asbestos Safety Program Requirements" (DOH)
 4. "New York State Uniform Fire Prevention and Building Code"
 5. New York State Education Department – Manual of Planning Standards

- D. Standards and Guidance Documents:
1. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection
 2. ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems
 3. EPA 560/585-024, Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)
 4. EPA 530-SW-85-007, Asbestos Waste Management Guidance
 5. ASTM Standard E1368 "Standard Practice for Visual Inspection of Asbestos Abatement Projects"

1.7 NOTICES

- A. The Contractor shall provide notification of intent to commence asbestos abatement activities as indicated below.
1. At least ten (10) Working days prior to beginning abatement activities, send written notification to:
U.S. Environmental Protection Agency
National Emissions Standards for Hazardous Air Pollutants (NESHAPS)
Coordinator
26 Federal Plaza
New York, NY 10007
 2. At least ten (10) days prior to beginning abatement activities send written notification to:
New York State Department of Labor
Division of Safety and Health, Asbestos Control Program.
State Office Campus
Building 12 - Room 161B
Albany, NY 12240
- B. The Contractor is required to send notifications to regulatory agencies via electronic, mail, or package delivery service that will provide proof of delivery and receipt.
- C. The Contractor shall be responsible for maintaining current project filings with regulatory agencies for the duration of the project.
- D. The Contractor shall post and/or provide Building Occupant Notification at least 10 days prior to beginning abatement activities as required by Code Rule 56.

1.8 PROJECT MONITORING AND AIR SAMPLING

- A. The Owner shall engage the services of an Environmental Consultant (the Consultant) who shall serve as the Owner's Representative in regard to the performance of the asbestos abatement Project and provide direction as required throughout the entire abatement Project period. The consultant and all subconsultants shall not have any contractual relationship with the Contractor for the duration of the asbestos project.

- B. The Contractor is required to ensure cooperation of its personnel with the Consultant for the air sampling and Project monitoring functions described in this section. The Contractor shall comply with all direction given by the Consultant during the course of the Project.
- C. The Consultant shall provide the following administrative services:
 - 1. Review and approve or disapprove all submittals, shop drawings, schedules, and samples.
 - 2. Assure that all notifications to governmental agencies by the Contractor are submitted in a timely manner and are correct in content.
- D. The Consultant shall staff the Project with a trained and certified person(s) to act on the Owner's behalf at the job site. This individual shall be designated as the Abatement Project Monitor (APM).
 - 1. The APM shall be on-site at all times the Contractor is on-site. The Contractor shall not be permitted to conduct any Work unless the APM is on-site (except for inspection of barriers and negative air system during non-working days).
 - 2. The APM shall have the authority to direct the actions of the Contractor verbally and in writing to ensure compliance with the Project documents and all regulations. The APM shall have the authority to Stop Work when gross Work practice deficiencies or unsafe practices are observed, or when ambient fiber concentrations outside the removal area exceed .01 f/cc or background level.
 - a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
 - b. Standby time and air sample collection and analysis required to resolve the situation shall be at the Contractor's expense.
 - 3. The APM shall provide the following services:
 - a. Inspection of the Contractor's Work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications.
 - b. Provide abatement Project air sampling as required by applicable regulations (NYS, AHERA) and the Owner. Sampling will include, but not be limited to background, work area preparation, asbestos handling, final cleaning, and clearance air sampling.
 - c. Verify daily that all Workers used in the performance of the Project are certified by the appropriate regulatory agency.
 - d. Monitor the progress of the Contractor's Work, and report any deviations from the schedule to the Owner.
 - e. Monitor, verify, and document all waste load-out operations including placement of generator and location labels on each waste container, as required by federal regulations.
 - f. Verify that the Contractor is performing personal air monitoring daily, and that results are being returned and posted at the site as required.
 - g. The APM shall maintain a log on site that documents all project related and Consultant and Contractor actions, activities, and occurrences.
 - h. Verify landfill to be used for waste disposal with waste transporter(driver) and Contractor prior to waste trailer/dumpster leaving site. Confirm the waste transporter firm and landfill are listed on the regulatory notifications

- for the project and the waste transport vehicle license number is listed on the current NYS DEC Waste Transporter permit.
4. The following minimum inspections shall be conducted by the APM, accompanied by the Contractor's supervisor. Additional inspections shall be conducted as required by Project conditions and/or the Owner's direction. Progression from one phase of Work to the next by the Contractor is only permitted with the written approval of the APM.
 - a. Pre-Construction Inspection: The purpose of this inspection is to verify the existing conditions of the Work Areas and to document these conditions.
 - b. Pre-Commencement Inspection: The purpose of this inspection is to verify the integrity of each containment system prior to disturbance of any asbestos containing material. This inspection shall take place only after the Work Area is fully prepped for removal.
 - c. Work Inspections: The purpose of this inspection is to monitor the Work practices and procedures employed on the Project and to monitor the continued integrity of the containment system. Inspections within the removal areas shall be conducted by the APM during all preparation, removal, and cleaning activities at least twice every Work shift. Additional inspections shall be conducted as warranted.
 - d. Pre-Encapsulation Inspection: The purpose of this inspection is to ensure the complete removal of Asbestos Containing Material (ACM), from all surfaces in the Work Area prior to encapsulation.
 - e. Visual Clearance Inspection: The purpose of this inspection is to verify that: all materials in the scope of work have been properly removed; no visible asbestos debris/residue remains; no pools of liquid or condensation remains; and all required cleanings are complete. This inspection shall be conducted before final air clearance testing.
 - f. Post-Clearance Inspection: The purpose of this inspection is to ensure the complete removal of ACM, including debris, from the Work Area after satisfactory final clearance sampling and removal of all isolation and critical barriers and equipment from the Work Area.
 - g. Punch List Inspection: The purpose of this inspection is to verify the Contractor's certification that all Work has been completed as contracted and the existing condition of the area prior to its release to the Owner.
 - E. The Consultant shall provide abatement Project air sampling and analysis as required by applicable regulations (New York State and/or AHERA). Sampling will include but is not limited to, background, work area preparation, asbestos handling, and final cleaning and clearance air sampling.
 1. Unless otherwise required by applicable regulations, the Consultant shall have samples analyzed by Phase Contrast Microscopy (PCM). Results shall be available within 24 hours of completion of sampling.
 2. Samples shall be collected as required by applicable regulations (New York State and/or AHERA) and these specifications. If Transmission Electron Microscopy (TEM) clearance air sampling is utilized by the owner, the clearance criteria and sampling protocols must be in compliance with AHERA. If PCM air sample analysis results exceed the satisfactory clearance criteria, then TEM analysis of the entire set of clearance air samples may be used, provided that a

standard NIOSH/ELAP accepted laboratory analysis method is utilized that shall report each air sample result in fibers per cubic centimeter.

3. If the air sampling during any phase of the abatement project reveals airborne fiber levels at or above .01 fibers/cc or the established background level, whichever is greater, outside the regulated Work Area, Work shall stop immediately and corrective measures required by Code Rule 56 shall be initiated. Notify all employers and occupants in adjacent areas. The Contractor shall bear the burden of any and all costs incurred by this delay.
4. The Environmental Consultant shall submit copies of all elevated air sampling results collected during abatement and all final air clearance results to the Commissioner of Labor, as required by regulation.
5. All final air clearances associated with this project must be run by TEM, as described in 40 CFR Part 763 Asbestos, Subpart E, 763.90 and as per New York State Education Department Requirements.

1.9 CONTRACTOR AIR SAMPLING

- A. In addition to the requirements of OSHA 1926.1101, the Contractor shall be required to perform personal air monitoring every Work shift in each Work Area during which abatement activities occur in order to determine that appropriate respiratory protection is being worn and utilized.
- B. The Contractor shall conduct air sampling that is representative of both the 8-hour time weighted average and 30-minute short-term exposures to indicate compliance with the permissible exposure and excursion limits.
- C. The Contractor's laboratory analysis of air samples shall be conducted by an NYS DOH ELAP approved laboratory. The consultant shall not collect or analyze the Contractor's air samples.
- D. Results of personnel air sample analyses shall be available, verbally, within twenty-four (24) hours of sampling and shall be posted upon receipt. Written laboratory reports shall be delivered and posted at the Work site within five (5) days. Failure to comply with these requirements may result in all work being stopped until compliance is achieved.

1.10 PROJECT SUPERVISOR

- A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:
 1. The Project Supervisor shall hold New York State certification as an Asbestos Supervisor.
 2. The Project Supervisor shall meet the requirements of a "Competent Person" as defined by OSHA 1926.1101 and shall have a minimum of one year experience as a supervisor.
 3. The Project Supervisor must be able to speak, read, and write English fluently, as well as communicate in the primary language of the Workers.
- B. If the Project Supervisor is not on-site at any time whatsoever, all Work shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Contractor may not remove the Project Supervisor from the Project without the

written consent of the Owner and the Environmental Consultant; however the Project Supervisor shall be removed from the Project if so requested by the Owner.

- C. The Project Supervisor shall maintain the bound Daily Project Log and the entry/exit logs as required by New York State Department of Labor and section 2.3 of the specifications and the Waste Disposal Log (Appendix B) required by section 4.3 of the specifications.
- D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Asbestos Project Monitor.

1.11 MEDICAL REQUIREMENTS

- A. Before exposure to airborne asbestos fibers, provide Workers with a comprehensive medical examination as required by 29 CFR 1910.1001, and 29 CFR 1926.1101.
 - 1. This examination is not required if adequate records show the employee has been examined as required by 29 CFR 1910.1001, and 29 CFR 1926.1101 within the past year.
 - 2. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving potential disturbance of asbestos fibers.

1.12 TRAINING

- A. As required by applicable regulations, prior to assignment to asbestos Work instruct each employee with regard to the hazards of asbestos, safety and health precautions, and the use and requirements of protective clothing and equipment.
- B. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134, and 29 CFR 1926.1101. Provide respirator training and fit testing.

1.13 RESPIRATORY PROTECTION

- A. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH).
- B. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual.
- C. Where fiber levels permit, and in compliance with regulatory requirements, Powered Air Purifying Respirators (PAPR) are the minimum allowable respiratory protection permitted to be utilized during gross removal operations of OSHA Class I or OSHA Class II friable ACM.
- D. No respirators shall be issued to personnel without such personnel participating in a respirator training program.
- E. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134 and 29 CFR 1926.1101.

- F. A storage area for respirators shall be provided by the Contractor in the clean room side of the personnel decontamination enclosure where they will be kept in a clean environment.
- G. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day.
- H. Filters used with negative pressure air purifying respirators shall not be used any longer than one eight (8) hour work day. Any loose respirator filters found within the regulated area, must be disposed of as asbestos waste.
- I. Any authorized visitor, Worker, or supervisor found in the Work Area not wearing the required respiratory protection shall be removed from the Project site and not be permitted to return.
- J. The Contractor shall have at least two (2) Powered Air Purifying Respirators stored on site designated for authorized visitors use. Appropriate respirator filters for authorized visitors shall be made available by the Contractor.

1.14 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in original packages with containers bearing manufacturer's name and label.
- B. Store all materials at the job site in a suitable and designated area.
 - 1. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.
 - 2. Protect materials from unintended contamination and theft.
 - 3. Storage areas shall be kept clean and organized.
- C. Remove damaged or deteriorated materials from the job site. Materials contaminated with asbestos shall be disposed of as asbestos debris as herein specified. This includes unused Contractor supplies located in the regulated work area.

1.15 TEMPORARY UTILITIES

- A. Shut down and lock out all electrical power to the asbestos Work Areas, including lighting circuits. Any electrical power passing through the Work Areas that can't be shut down due to health and safety reasons, shall be protected as per the requirements of Industrial Code Rule 56.
- B. Provide temporary 120-240 volt, single phase, three wire, 100 amp electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the asbestos Work Area.
 - 1. Where available, obtain from Owner's existing system. Otherwise provide power from other sources (i.e. generator).
 - 2. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.
 - 3. Provide wiring and receptacles as required by the Environmental Consultant for project monitoring and air sampling equipment (pumps, fans, leaf blowers, etc.).

4. All power to the Work Area shall be brought in from outside the area through GFCI's at the source.
- C. Provide temporary lighting with "weatherproof" fixtures for all Work Areas including decontamination chambers.
 1. The entire Work Area shall be kept illuminated at all times.
 2. Provide lighting as required by the Environmental Consultant for the purposes of performing required inspections.
- D. All temporary devices and wiring used in the Work Area shall be capable of decontamination procedures including HEPA vacuuming and wet-wiping.
- E. Utilize domestic water service, if available, from Owner's existing system. Provide hot water heaters with sufficient capacity to meet Project demands.

PART 2 PRODUCTS

2.1 PROTECTIVE CLOTHING

- A. Provide personnel utilized during the Project with disposable protective whole body clothing, head coverings, gloves and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber for comfort, but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape, or provide disposable coverings with elastic wrists or tops.
- B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.
- C. Eye protection and hard hats shall be provided and made available for all personnel entering any Work Area.
- D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Work Area.

2.2 SIGNS AND LABELS

- A. Provide warning signs and barrier tapes at all approaches to asbestos Work Areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.
 1. Provide danger signs in vertical format conforming to 29 CFR 1926.1101, minimum 20" x 14" displaying the following legend.

DANGER
ASBESTOS CANCER AND LUNG DISEASE
HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

2. Provide 3" wide yellow barrier tape printed with black lettered, "DANGER ASBESTOS REMOVAL". Locate barrier tape across all corridors, entrances and access routes to asbestos Work Area. Install tape 3' to 4' AFF.
- B. Provide asbestos danger labels affixed to all asbestos materials, scrap, waste, debris and other products contaminated with asbestos.
 1. Provide asbestos danger labels of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

2. Provide the following asbestos labels, of sufficient size to be clearly legible, for display on waste containers (bags or drums) which will be used to transport asbestos contaminated material in accordance with United States Department of Transportation 49 CFR Parts 171 and 172: (Note: Include "RQ" for friable asbestos waste only.)

RQ, NA2212, (WASTE) ASBESTOS, 9, PGIII
3. Generator identification information shall be affixed to each waste container or any packaging used to containerize asbestos waste indicating the following printed in indelible ink:

Generator Name; Facility Name; Facility Address; Date

2.3 DAILY PROJECT LOG & WORK AREA ENTRY/EXIT LOG

- A. Provide a bound Daily Project Log. The log shall contain on title page the Project name; name, address and phone number of Owner; name, address and phone number of Environmental Consultant; name, address and phone number of Abatement Contractor; emergency numbers including, but not limited to local Fire/Rescue department and all other New York State Department of Labor requirements.
- B. All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.
- C. All persons entering and exiting the Work Area shall sign the entry/exit log and include name, certification number, and time.
- D. The Project Supervisor shall document all Work performed daily and note all inspections required by Code Rule 56, i.e. testing and inspection of barriers and enclosures.

2.4 SCAFFOLDING AND LADDERS

- A. Provide all scaffolding and/or staging as necessary to accomplish the Work of this Contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type,

erection and use of all scaffolding and ladders shall comply with all applicable OSHA construction industry standards.

- B. Provide scaffolding and ladders as required by the Environmental Consultant for the purposes of performing required inspections.

2.5 SURFACTANT (AMENDED WATER)

- A. Wet all asbestos-containing materials prior to removal with surfactant mixed and applied in accordance with manufacturer's printed instructions.

2.6 ENCAPSULANT

- A. Encapsulant shall be tinted or pigmented so that application when dry is readily discernible.
- B. The encapsulant solvent or vehicle shall not contain a volatile hydrocarbon.

2.7 WASTE DISPOSAL BAGS, DRUMS, AND CONTAINERS

- A. Provide 6 mil polyethylene disposal bags printed with asbestos caution labels. Bags shall also be imprinted with U.S. Department of Transportation required markings.
- B. Provide 30 or 55 gallon capacity fiber, plastic, or metal drums capable of being sealed air and water tight if asbestos waste has the potential to damage or puncture disposal bags. Affix asbestos caution labels on lids and at one-third points around drum circumference to assure ready identification.
- C. Containers and bags must be labeled accordance with 40 CFR Part 61 NESHAPS and Code Rule 56. When the bags/containers are moved to the holding area, lockable trailer, or lockable hardtop dumpster from the waste decontamination system washroom, each bag/container must also be appropriately labeled with the date moved in waterproof markings.
- D. Labeled ACM waste containers or bags shall not be used for non-ACM waste or trash. Any material placed in labeled containers or bags, whether turned inside out or not shall be handled and disposed of as ACM waste.

2.8 HEPA VACUUM EQUIPMENT

- A. All vacuuming performed under this contract shall be performed with High Efficiency Particulate Air (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.

2.9 POWER TOOLS

- A. Any power tools used to drill, cut into, or otherwise disturb asbestos material shall be manufacturer equipped with HEPA filtered local exhaust ventilation.

2.10 FIRE RETARDANT PLASTIC SHEETING

- A. All polyethylene (plastic) sheeting used on the Project (including but not limited to sheeting used for critical and isolation barriers, fixed objects, walls, floors, ceilings, waste container) shall be at least 6 mil fire retardant sheeting.

- B. Decontamination enclosure systems shall utilize at least 6 mil opaque fire retardant plastic sheeting. At least 2 layers of 6 mil reinforced fire retardant plastic sheeting shall be used for the flooring.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Should visible emissions or water leaks be observed outside the Work Area, immediately stop Work and institute emergency procedures per Code Rule 56. Should there be elevated fiber levels outside the Work Area, immediately stop Work, institute emergency procedures per Code Rule 56, and notify all employers and occupants in adjacent areas. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.
- B. Valid NYS DOL Asbestos Handler certification cards shall be on site prior to admittance of any Contractor's employees to the asbestos Work Area.
- C. The following submittals, documentation, and postings shall be maintained on-site by the Contractor during abatement activities at a location approved by the Abatement Project Monitor:
 - 1. Valid Contractor handling license issued by New York State Department of Labor.
 - 2. NYS DOL Asbestos Handler certification cards for each person employed in the removal, handling, or disturbance of asbestos.
 - 3. Daily OSHA personal air monitoring results.
 - 4. NYS Department of Health ELAP certification for the laboratory that will be analyzing the OSHA personnel air samples.
 - 5. NYS Department of Environmental Conservation Waste Transporter Permit.
 - 6. Project documents (specifications and drawings.)
 - 7. Notifications, Variances, Approved Work Plan. Ensure that the most up-to-date notifications and Variances are on-site.
 - 8. Applicable regulations.
 - 9. Material Safety Data Sheets of supplies/chemicals used on the Project.
 - 10. Disposal Site/Landfill Permit from applicable regulatory agency.
 - 11. List of emergency telephone numbers.
 - 12. Magnahelic manometer semi-annual calibration certification.
 - 13. Waste Disposal Log.
 - 14. Daily Project Log.
 - 15. Entry/Exit Logs.
- D. The following documentation shall be maintained on-site by the Abatement Project Monitor during abatement activities:
 - 1. Valid Contractor handling license issued by New York State Department of Labor.
 - 2. Air Sample Log.
 - 3. Air sample results.
 - 4. Project Monitor Daily Log
 - 5. Asbestos Survey Report.

6. A copy of ASTM Standard E1368 "Standard Practice for Visual Inspection of Asbestos Abatement Projects."
 7. Calibration chart for rotometer(s) used on-site.
- E. The Work Area must be vacated by building occupants prior to decontamination enclosure construction and Work Area preparation.
- F. All demolition necessary to access asbestos containing materials for removal must be conducted within negative pressure enclosures by licensed asbestos handlers. Demolition debris may be disposed of as construction and demolition debris provided the Abatement Project Monitor determines that it is not contaminated with asbestos and there has been no disturbance of ACM within the enclosure. If the demolition debris is determined to be contaminated or ACM has been disturbed, it must be disposed of as asbestos waste.

3.2 PERSONNEL DECONTAMINATION ENCLOSURE

- A. Provide personnel decontamination enclosure contiguous to the Work Area or as per Variance. The decontamination enclosure shall be attached to the Work Area and not located within it unless isolation barriers are installed. If the decontamination chamber is accessible to the public it shall be fully framed, sheathed, and lockable to prevent unauthorized entry.
- B. Access to the Work Area will be from the clean room through an air-lock to the shower and through an air lock to the equipment room. Each airlock shall be a minimum of three feet from door to door. Additional air locks shall be provided as required by Code Rule 56 for remote decontamination enclosures.
- C. The decontamination enclosure ceiling and walls shall be covered with one layer of opaque 6 mil fire retardant plastic sheeting. Two layers of reinforced fire retardant plastic sheeting shall be used to cover the floor.
- D. The entrance to the clean room shall have a lockable door with adequate small openings for Work Area make-up air. Provide suitable lockers for storage of Worker's street clothes. Storage for respirators along with replacement filters and disposable towels shall also be provided.
- E. Provide a temporary shower with individual hot and cold water supplies and faucets. Provide a sufficient supply of soap and shampoo. There shall be one shower for every six Workers. The shower room shall be constructed in such a way so that travel through the shower chamber shall be through the shower. The shower shall not be able to be bypassed.
- F. Shower water shall be drained, collected and filtered through a system with at least a 5.0 micron particle size collection capability containing a series of several filters with progressively smaller pore sizes to avoid rapid clogging of the system. The filtered waste water shall then be discharged in accordance with applicable codes and the contaminated filters disposed of as asbestos waste.

- G. The equipment room shall be used for the storage of tools and equipment. A walk-off pan filled with water shall be located in the Work Area outside the equipment room for Workers to clean foot coverings when leaving the Work Area. A labeled 6 mil plastic ACM waste bag for collection of contaminated clothing shall be located in this room.
- H. The personal decontamination enclosure shall be cleaned and disinfected minimally at the end of each Work shift and as otherwise directed by the Asbestos Project Monitor.

3.3 WASTE DECONTAMINATION ENCLOSURE

- A. Provide a waste decontamination enclosure contiguous to the Work area. The decontamination enclosure shall be attached to the Work Area and not located within it unless isolation barriers are installed. If the decontamination chamber is accessible to the public it shall be fully framed, sheathed, and lockable to prevent unauthorized entry.
- B. The waste decontamination enclosure system shall consist of a holding area, air lock and washroom. The airlock shall be a minimum of three feet from door to door. The entrance to the holding area shall have a lockable door.
- C. The decontamination enclosure ceiling and walls shall be covered with one layer of opaque 6 mil fire retardant plastic sheeting on walls and ceiling. Two layers of reinforced fire retardant plastic sheeting shall be used to cover the floor.
- D. Where there is only one egress from the Work Area, the holding area of the waste decontamination enclosure system may branch off from the personnel decontamination enclosure equipment room, which then serves as the waste wash room.
- E. The waste wash room water shall be drained, collected, and filtered through a system with at least a 5.0 micron particle size collection capability containing a series of several filters with progressively smaller pore sizes to avoid rapid clogging of the system. The filtered waste water shall then be discharged in accordance with applicable codes and the contaminated filters disposed of as asbestos waste.
- F. In small asbestos Projects where only one egress from the Work Area exists, the shower room may be used as a waste washroom. In this instance, the clean room shall not be used for waste storage, but shall be used for waste transfer to carts, which shall immediately be removed from this enclosure.

3.4 WORK AREA ENTRY AND EXIT PROCEDURES

- A. Access to and from the asbestos Work Area is permitted only through the personnel decontamination enclosure unless otherwise stipulated in a Site Specific Variance.
- B. Workers shall sign the entry/exit log upon every entry and exit.
- C. The following procedures shall be followed when entering the Work Area:
 - 1. Before entering the Work Area, Workers shall proceed to the clean room, remove all street clothes, and don protective clothing, equipment, and respirators.

2. Workers shall proceed from the clean room through the shower room and the equipment room and into the Work Area.
- D. The following procedures shall be followed when exiting the Work Area:
1. Before leaving the Work Area, gross asbestos contamination will be removed by brushing, wet cleaning and/or HEPA vacuuming, followed by use of the walk-off pan.
 2. In the equipment room, Workers shall remove disposable clothing, but not respirators, and shall place clothing in plastic disposal bags for disposal as contaminated debris prior to entering the shower room. Reusable equipment shall be removed and stored in the equipment room (e.g, work boots).
 3. Workers shall shower thoroughly while wearing respirators, then wash respirator with soap and water prior to removal.
 4. Upon exiting the shower, Workers shall enter the clean room and don new disposable clothing if the Work shift is to continue or street clothes to exit area. Under no circumstances shall Workers enter public non-Work Areas in disposable protective clothing.
- E. If remote decontamination enclosures are permitted by Code Rule 56 or a Site Specific Variance, workers shall wear two disposable suits for all phases of Work. Workers exiting the work area shall HEPA vacuum the outer suit, enter the airlock, remove the outer suit and then place it back into the Work Area. A clean second suit shall be donned before exiting the airlock and proceeding to the decontamination enclosure or another work area via the designated pathway required by Code Rule 56.

3.5 WORK AREA PREPARATION

- A. Asbestos danger signs shall be posted at all approaches to the asbestos Work Area. Post all emergency exits as emergency exits only on the Work Area side, post with asbestos caution signs on the non-Work Area side. Provide all non-Work Area stairs and corridors accessible to the asbestos Work Area with warning tapes at the base of stairs and beginning of corridors. Warning tapes shall be in addition to caution signs.
- B. Shut down and lock out the building heating, ventilating, and air conditioning systems. Electrical systems and circuits shall also be shut down unless permitted to remain active per Code Rule 56 and appropriately protected and labeled. Existing lighting sources shall not be utilized. Provide temporary electric power and lighting as specified herein.
- C. All non-ACM surfaces and objects within the Work Area shall be pre-cleaned using HEPA vacuuming and/or wet-wiping methods. Dry sweeping and any other methods that raise dust shall be prohibited. ACM shall not be disturbed during pre-cleaning.
- D. Movable objects within the Work Area shall be HEPA vacuumed and/or wet-wiped and removed from the Work Area.
- E. All non-movable equipment in the Work Area shall be completely covered with 2 layers of fire retardant plastic sheeting, at least 6 mil in thickness, and secured in place with duct tape and/or spray adhesive. Active Fire Protection System components in the

Work Area shall not be covered with fire retardant plastic sheeting or any other obstruction.

- F. Provide enclosure of the asbestos Work Area necessary to isolate it from unsealed areas of the building in accordance with the approved asbestos Work plan and as specified herein.
- G. Provide critical barriers by sealing off all openings including but not limited to operable windows and skylights, doorways, diffusers, grills, electrical outlets and boxes, doors, floor drains, and any other penetrations to surfaces in the Work Area enclosure, using 2 layers of at least 6 mil fire retardant plastic sheeting.
- H. Provide isolation barriers by installing temporary framing and sheathing at openings larger than 32 square feet forming the limits of the asbestos Work Area. Sheathing thickness must be a minimum of 3/8 inch and all sheathing shall be caulked and the Work Area side sealed with two layers of 6 mil fire retardant plastic sheeting. Isolation barriers in stairwells and at work area egress locations shall not be covered with sheathing, only two layers of 6 mil fire retardant plastic sheeting.
- I. Isolation barriers shall be installed at all elevator openings in the Work Area. Elevators running through the regulated abatement work area shall be shut down or isolated as per Code Rule 56. Elevator controls shall be modified so that elevators bypass the Work Area
- J. Provide two independent layers of 6 mil fire retardant plastic sheeting over all floor, wall, and ceiling surfaces. Isolation barriers shall also be covered with two independent layers (for a total of four layers). Sheeting shall be secured with duct tape. All joints in fire retardant plastic sheeting shall overlap 12" minimum. Carpeting left in place shall be covered with 3/8 inch plywood sheathing prior to plasticizing.
- K. Unless otherwise specified for removal, the Contractor shall either protect all fiberglass insulation on piping, ductwork, tanks, etc. in the Work Area using two layers of six mil fire retardant plastic sheeting or remove the insulation as asbestos containing waste. If the Contractor elects to remove the fiberglass insulation as asbestos-contaminated, he/she shall be responsible for reinsulation if reinsulation of removed insulations is part of the Contract or Project.
- L. Frame out emergency exits from Work Area. Provide double layer 6 mil fire retardant plastic sheeting and tape seal opening. Post as emergency exits only and tape utility knife to the Work Area side of each exit. Within the Work Area, mark the locations and directions of emergency exits throughout the Work Area using exit signs and/or duct tape.
- M. Remove all items attached to or in contact with ACM only after the Work Area enclosure is in place. HEPA vacuum and wet wipe with amended water all items prior to their removal from the Work Area and before the start of asbestos removal operations.

- N. Suspended ceiling tiles shall only be removed after Work Area preparation is complete. If possible, non-contaminated ceiling tiles shall be HEPA vacuumed and removed from the Work Area before asbestos removals begin. Contaminated ceiling tiles shall be disposed of as asbestos waste.

3.6 NEGATIVE AIR PRESSURE FILTRATION SYSTEM

- A. Provide a portable asbestos filtration system that develops a minimum pressure differential of negative 0.02 in. of water column within all full enclosure areas relative to adjacent unsealed areas and that provides a minimum of 4 air changes per hour in the Work Area during abatement and 6 air changes for non-friable flooring and/or mastic removal.
- B. Such filtration systems must be made operational after critical and isolation barriers are installed but before wall, floor, and ceilings are plasticized and shall be operated 24 hours per day during the entire Project until the final cleanup is completed and satisfactory results of the final air samples are received from the laboratory.
- C. The system shall include a series of pre-filters and filters to provide High Efficiency Particulate Air (HEPA) filtration of particles down to 0.3 microns at 100% efficiency and below 0.3 microns at 99.9% efficiency. Provide sufficient replacement filters to replace pre-filters every 2 hours, secondary pre-filters every 24 hours, and primary HEPA filters every 600 hours (25 continuous days) of operation. HEPA filter sides shall be marked with installation date during all new HEPA filter installations on project.
- D. A minimum of one additional filtration unit of at least the same capacity as the primary unit(s) shall be installed and fully functional to be used during primary unit (s) filter changing and in case of primary failure.
- E. At no time will the unit exhaust indoors, within 15 feet of a receptor, including but not limited to windows and doors, or adversely affect the air intake of the building. Exhaust ducting shall not exceed 25' in length, except as allowed by Industrial Code Rule 56. Provide construction fencing at ground level exhaust termination locations per Code Rule 56.
- F. Upon electric power failure or shut-down of any filtration unit, all abatement activities shall stop immediately and only resume after power is restored and all filtration units are fully operating. For shut-downs longer than one hour, all openings into the Work Area, including the decontamination enclosures, shall be sealed.
- G. For all OSHA Class I removal Work Areas, the Contractor shall provide a manometer to verify negative air pressure. Manometers shall be read twice daily and recorded within the Daily Project Log.
- H. There shall be at least a 4 hour settling period after the Work Area is fully prepared and the negative filtration units have been started to ensure integrity of the barriers.
- I. Once installed and operational, the Contractor's Supervisor shall conduct daily inspections of the Work Area to insure the airtight integrity of the enclosure and operation of the negative air system. Findings shall be recorded within the Daily

Project Log. Inspections shall also be conducted on days when no abatement activities are in progress per Code Rule 56 (i.e. weekends).

3.7 REMOVAL OF ASBESTOS CONTAINING MATERIALS

- A. Asbestos-containing materials shall be removed in accordance with the Contract Documents and the approved Asbestos Work Plan. Only one type of ACM shall be abated at a time within a Work Area. Where there are multiple types of ACM requiring abatement, Code Rule 56 procedures for sequential abatement shall be followed.
- B. Sufficiently wet asbestos materials with a low pressure, airless fine spray of surfactant to ensure full penetration prior to material removal. Re-wet material that does not display evidence of saturation.
- C. One Worker shall continuously apply amended water while ACM is being removed.
- D. Perform cutting, drilling, abrading, or any penetration or disturbance of asbestos containing material in a manner to minimize the dispersal of asbestos fibers into the air. Use equipment and methods specifically designed to limit generation of airborne asbestos particles. All power operated tools used shall be provided with manufacturer HEPA equipped filtered local exhaust ventilation, as required by regulation.
- E. Upon removal of ACM from the substrate, the newly exposed surfaces shall be HEPA vacuumed and/or wet cleaned. Surfaces must be thoroughly cleaned using necessary methods and any required solvents to completely remove any adhesive, mastic, etc.
- F. All removed material shall be placed into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate. Cleanup of accumulations of loose debris or waste shall be performed whenever there is enough accumulation to fill a single bag or container and minimally at the end of each workshift.
- G. Large components shall be wrapped in two layers of 6 mil fire retardant plastic sheeting. Sharp components likely to tear disposal bags shall be placed in fiber drums or boxes and then wrapped with sheeting.
- H. Power or pressure washers are not permitted for asbestos removal or clean-up procedures unless approved in a Site Specific Variance and allowed by owner.
- I. All open ends of pipe and duct insulation not scheduled for removal shall be encapsulated using lag cloth.
- J. All construction and demolition debris determined by the Environmental Consultant to be contaminated with asbestos shall be handled and disposed of as asbestos waste.
- K. The use of metal shovels, metal dust pans, etc. are not permitted inside the work area.

3.8 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION AND REMOVAL PROCEDURES

- A. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the Work Area before moving such items into the

waste decontamination enclosure system airlock by persons assigned to this duty. The persons in the Work Area shall not enter the airlock. No gross removal operations are permitted when waste transfer is in progress.

- B. The containers and equipment shall be removed from the airlock by persons stationed in the washroom during waste removal operations. The external surfaces of containers and equipment shall be cleaned a second time by wet cleaning.
- C. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated 6 mil plastic bags or sheeting, as the item's physical characteristics demand, and sealed airtight.
- D. The clean recontainerized items shall be moved into the airlock that leads to the holding area. Workers in the washroom shall not enter this airlock.
- E. Containers and equipment shall be moved from the airlock and into the holding area by persons dressed in clean personal protective equipment, who have entered from the holding area.
- F. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding until transfer to the waste container. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.
- G. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.
- H. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.

3.9 WORK AREA DECONTAMINATION, CLEANING, AND CLEARANCE PROCEDURES

- A. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed unless modified by a Site Specific Variance.
- B. First Cleaning:
 - 1. All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.
 - 2. All surfaces in the Work Area shall be wet cleaned, except active fire protection system components that may be damaged by water. A wet-purpose shop vacuum may be used to pick up excess liquid, and may either be decontaminated prior to removal from the Work Area or disposed of as asbestos waste.
 - 3. The Abatement Project Monitor (APM) shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement.
 - 4. The Contractor shall then apply a thin coat of encapsulant to all surfaces in the Work Area that were not the subject of removal. In no event shall encapsulant

be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results. Encapsulants shall be pigmented or tinted to provide an indication for completeness of coverage. The APM shall determine adequacy of coverage.

5. After the encapsulant has been applied and the required waiting/settling / drying time has elapsed, the first layer of fire retardant plastic sheeting shall then be removed and bagged as asbestos waste.

C. Second Cleaning

1. All surfaces in the Work Area shall be HEPA vacuumed and then wet cleaned. Wet cleaning of active fire protection system components is not necessary if damage may occur.
2. The APM shall conduct a second visual inspection of the Work Area for cleanliness.
3. After the required waiting/settling/drying time has elapsed, the second layer of fire retardant plastic sheeting shall be removed and bagged as asbestos waste.

D. Third Cleaning

1. All surfaces in the Work Area shall be HEPA vacuumed and then wet cleaned. Wet cleaning of active fire protection system components is not necessary if damage may occur.
2. After the required waiting/settling/drying time has elapsed, the APM shall conduct a third visual inspection of the Work Area for completeness of abatement and cleanliness. The APM shall document the results of the visual inspection in the Project Monitor Log and Contractor's Daily Project Log.
3. After satisfactory APM visual inspection, aggressive final clearance air sampling shall then be conducted by the Environmental Consultant provided no visible asbestos debris/residue; pools of liquid, or condensation remains. NOTE: TEM samples should be used vs. PCM if demolition or other dust-generating evolutions are taking place in adjacent areas, as evident from excessive loading.
4. Upon receipt of satisfactory final clearance air sampling results, the negative air pressure equipment can then be shut down, and the isolation and critical barriers removed and bagged as asbestos waste. Following this and satisfactory inspections by the project supervisor and the APM for cleanliness, the decontamination enclosures shall be removed.

- E. As a result of any visual inspection by the APM or should air sampling results indicate high fiber levels, the Contractor will reclean the affected areas at no additional expense to the Owner.

3.10 TENT ENCLOSURES

- A. Tent enclosures may only be used where specifically permitted by Code Rule 56 or a Site Specific Variance issued by the NYS Department of Labor.
- B. The Contractor shall restrict access to the immediate area where tent removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.

- C. Remote personnel decontamination enclosures shall be constructed. Configuration shall be as required by Project size and a washroom with attached airlock shall be constructed contiguous to the tent enclosure for small and large size tent enclosure work areas. For tent enclosures with gross abatement of friable materials, a contiguous decontamination system shall be constructed, maintained and utilized, except for minor size tent enclosure work areas where an adjacent decontamination room or area is permitted by Code Rule 56.
- D. The Work Area shall be precleaned. All objects and equipment that will remain in the restricted area during abatement shall be sealed with two layers of six mil polyethylene and tape.
- E. The tent shall be a single use barrier constructed with a rigid frame and at least two layers of six mil polyethylene unless one layer of six mil polyethylene is otherwise permitted by Code Rule 56. Tents with twenty (20) square feet or less of floor space or no gross removal of friable ACM shall be constructed of one (1) layer of six mil polyethylene and shall include walls, ceilings and a floor (except portions of walls, floors and ceilings that are the removal surface) with double folded seams. All seams shall be sealed airtight using duct tape and/or spray adhesive.
- F. The tent shall be constructed with at least one airlock for worker/waste egress.
- G. A manometer shall be used for all OSHA Class I abatement.
- H. Negative air shall be maintained at four (4) air changes per hour for non-friable and glovebag abatement tent enclosure work areas. Eight (8) air changes shall be maintained for friable gross removal tent enclosure work areas. In a Minor size abatement tent enclosure work area a HEPA vacuum may be used to maintain the required air changes.
- I. OSHA compliance air monitoring is required per section 1.9.
- J. ACM removal shall follow procedures defined in section 3.7.
- K. Waste material shall be placed in properly labeled 6 mil plastic bags or other appropriate containers. The outside of the bags or containers shall be wet wiped and/or HEPA vacuumed in the washroom and shall then be placed in a second bag/container before being transferred to the waste storage container. All transportation of waste bags and containers outside the Work Area shall be in watertight carts. These carts shall be held in the holding area until transfer to the waste container. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.
- L. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed.
 - 1. All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.

2. All surfaces in the Work Area shall be wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid, and shall be decontaminated prior to removal from the Work Area.
3. The Contractor shall then apply a thin coat of encapsulant to all non-removal surfaces covered with plastic in the Work Area. In no event shall encapsulant be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results. Encapsulants shall be pigmented or tinted to provide an indication for completeness of coverage. The APM shall determine adequacy of coverage.
3. After the waiting/settling/drying time requirements have elapsed, the Asbestos Project Monitor shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement. The APM shall document the results of the visual inspection in the Project Monitor Log and Contractor's Daily Project Log.
4. After satisfactory APM visual inspection, aggressive final clearance air sampling shall then be conducted by the Environmental Consultant.
5. Upon receipt of satisfactory final clearance air sampling results, the tent shall be collapsed into itself, placed in suitable disposal bags, and transferred through the washroom to the waste decontamination enclosure. Isolation and critical barriers shall then be removed and bagged as asbestos waste followed by satisfactory visual inspections by the project supervisor and the APM for cleanliness.

3.11 GLOVEBAG REMOVAL

- A. Glovebag removals may only be used as specifically permitted by Code Rule 56 or a Site Specific Variance issued by the NYS Department of Labor. Glovebags may only be used on pipe or duct insulation.
- B. In addition to conformance with applicable regulations and variances, glovebag removals are only permitted to be conducted within tent enclosures complying with these specifications.
- C. The Contractor shall restrict access to the immediate area where tent/glovebag removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- D. Remote personnel decontamination enclosures shall be constructed. Configuration shall be as required by Project size and a washroom with attached airlock shall be constructed contiguous to the tent enclosure.
- E. Glovebag removals shall utilize commercially available glovebags of at least six mil thickness. Use shall be in accordance with the manufacturer's instructions and the following minimum requirements:
 1. The sides of the glovebag shall be cut to fit the size pipe being removed. Tools shall be inserted into the attached tool pocket.
 2. The glovebag shall be placed around the pipe and the open edges shall be folded and sealed with staples and duct tape. The glovebag shall also be sealed at the pipe to form a tight seal.
 3. Openings shall be made in the glovebag for the wetting tube and HEPA vacuum hose. The opening shall be sealed to form a tight seal.

4. All glovebags shall be smoke tested by the Asbestos Project Monitor under negative pressure using the HEPA vacuum before removal operations commence. Glovebags that do not pass the smoke test shall be resealed and then retested.
 5. After first wetting the materials to be removed, removal may commence. ACM shall be continuously wetted. After removal of the ACM, the piping shall be scrubbed or brushed so that no visible ACM remains. Open ends of pipe insulation shall be encapsulated.
 6. After the piping is cleaned, the inside of the glovebag shall be washed down and the wetting tube removed. Using the HEPA vacuum, the glovebag shall be collapsed and then twisted and sealed with tape with the ACM at the bottom of the bag.
 7. A disposal bag shall be placed around the glovebag that is then detached from the pipe. The disposal bag is then sealed and transferred through the washroom to the waste storage container.
- F. After glovebag removals are complete, tent decontamination procedures shall be followed.

3.12 REMOVALS OF EXTERIOR NON-FRIABLE ACM

- A. Except as modified by this section, removal of exterior non-friable ACM (i.e. roof flashings, built-up roofing, siding, caulking, glazing compound, transite, tars, sealers, coatings, and other NOB ACM) shall conform to all provisions of this specification.
- B. Unless Site Specific Variances have been otherwise obtained, removals shall be conducted in accordance with the provisions of Code Rule 56.
- C. The Work Area shall be the area from which ACM materials are being removed and shall extend 25 feet from the perimeter of the removal area.
- D. Non-certified Workers are not allowed in the Work Area until the Work Area is cleared by the Asbestos Project Monitor (APM).
- E. Remote personnel decontamination enclosures shall be constructed at a location in accordance with the approved Work Plan. Unless located outside the Work Area, decontamination enclosures are not permitted to be constructed on the roof. Decontamination enclosures shall be constructed as close to the regulated abatement work area as physically possible, but no greater than 50 feet from the building. It shall be cordoned off at a distance of 25 feet to separate it from public areas.
- F. All openings (including but not limited to operable windows, doors, hatches, vents, ducts, and grilles) one story above, one story below, and within 25 feet of the work area shall be sealed with two layers of six mil polyethylene. Alternately, a polyethylene drape may be used instead of sealing windows individually where permitted by Code Rule 56.
- G. The removal of the ACM may require the use of scrapers, solvents, mastic removal chemicals, or other methods/procedures to ensure complete removal.

- H. The Contractor is required to provide temporary protection of the building (i.e. roof, window openings, construction joints, etc.) at the end of each Work shift so as to maintain the building in a watertight condition.
- I. Dumpsters used for waste storage shall be lined with two layers of six mil polyethylene and shall have a hard top. Where open-top dumpsters are permitted by ICR 56 or a Site Specific Variance, the top shall be closed with polyethylene flaps that are sealed at the end of each work shift.
- J. Personal protective equipment, including respirators, shall be utilized and worn during all removal operations until the Work Area is cleared by the APM.
- K. The Owner may, at his discretion, choose to conduct air sampling. If air samples collected during abatement indicate any airborne asbestos fiber concentration(s) at or above 0.01 f/cc, Work shall be stopped immediately and Work methods shall be altered to reduce the airborne asbestos fiber concentration(s).
- L. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed:
 - 1. All surfaces in the Work Area shall be HEPA vacuumed and then wet cleaned.
 - 2. The APM shall conduct a visual inspection of the Work Area for cleanliness and completeness of abatement. The APM shall document the results of the visual inspection in the Project Monitor Log and Contractor's Daily Project Log.
 - 3. Upon satisfactory visual inspection results, the isolation and critical barriers shall be removed and bagged as asbestos waste. Following this, the decontamination enclosures shall be removed.

3.13 NON-FRIABLE FLOORING AND/OR MASTIC REMOVALS

- A. The following procedures may only be used for the removal of non-friable flooring and/or mastic materials using manual and chemical methods. These procedures shall not apply to beadblaster use or other abrasive abatement methods.
- B. The Contractor shall restrict access to the immediate Work Area where non-friable ACM removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- C. Remote personnel decontamination enclosures may be utilized and shall be constructed at a location in accordance with the approved Work Plan. A washroom with attached airlock shall be constructed contiguous to each Work area enclosure.
- D. The Work Area shall be prepared per section 3.5, except that ceilings, walls, and floors need not be fully plasticized. However, a four-foot high single layer of 6-mil fire retardant plastic sheeting shall be installed as a splashguard at all walls adjoining mastic removal portions of the work area, to prevent damage to the existing walls.
- E. Negative air shall be maintained at six (6) air changes per hour.
- F. OSHA compliance air monitoring is required per section 1.9.

- G. ACM removal shall follow procedures defined in section 3.7.
- H. Waste material shall be placed in properly labeled 6 mil plastic bags or other appropriate containers. The outside of the bags or containers shall be wet wiped and/or HEPA vacuumed in the washroom and double-bagged before being passed into the airlock. The bags or containers shall then be transported to the waste storage container. All transportation of waste bags and containers outside the Work Area shall be in watertight carts.
- I. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed.
 - 1. All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.
 - 2. All plastic sheeting splashguards shall be removed and containerized, followed by all surfaces in the Work Area being wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid, and shall be decontaminated prior to removal from the Work Area.
 - 3. The Contractor shall then apply a thin coat of encapsulant to all non-removal surfaces in the Work Area. In no event shall encapsulant be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results. Encapsulants shall be pigmented or tinted to provide an indication for completeness of coverage. The APM shall determine adequacy of coverage.
 - 4. After the waiting/settling/drying time requirements have elapsed, the Asbestos Project Monitor (APM) shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement. The APM shall document the results of the visual inspection in the Project Monitor Log and Contractor's Daily Project Log.
 - 5. After satisfactory APM visual inspection, aggressive final clearance air sampling shall then be conducted by the Environmental Consultant.
 - 6. Upon receipt of satisfactory final clearance air sampling results, the isolation and critical barriers shall be removed and bagged as asbestos waste. Following this and satisfactory inspections by the project supervisor and the APM for cleanliness the decontamination enclosures shall be removed.

3.14 RESTORATION OF UTILITIES, FIRESTOPPING, AND FINISHES

- A. After final clearance, remove locks and restore electrical and HVAC systems. All temporary power shall be disconnected, power lockouts removed and power restored. All temporary plumbing shall be removed.
- B. Finishes damaged by asbestos abatement activities including, but not limited to, plaster/paint damage due to duct tape, staples, and spray adhesives, and floor tile lifted due to wet or humid conditions, shall be restored prior to final payment.
 - 1. Finishes unable to be restored shall be replaced under this Contract at the Contractor's expense.
 - 2. All foam and expandable foam products and materials used to seal Work Area openings shall be completely removed upon completion of abatement activities.

- C. All penetrations (including, but not limited to, pipes, ducts, etc.) through fire rated construction shall be firestopped using materials and systems tested in accordance with ASTM E814 on Projects where reinsulation is part of the required work.

PART 4 DISPOSAL OF ASBESTOS WASTE

4.1 TRANSPORTATION AND DISPOSAL SITE

- A. The Contractor's Hauler and Disposal Site shall be approved by the Owner. All waste generated during the asbestos project shall be disposed of as RACM asbestos waste.
- B. The Contractor shall give twenty-four (24) hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal working hours unless otherwise specified. No waste may be taken from the site unless the Contractor and Environmental Consultant are present and the Environmental Consultant authorizes the release of the waste as described herein.
- C. All waste generated as part of the asbestos project shall be removed from the site within ten (10) calendar days after successful completion of all asbestos abatement work.
- D. Upon arrival at the Project Site, the Hauler must possess and present to the Environmental Consultant a valid New York State Department of Environmental Conservation Part 364 Asbestos Hauler's Permit. The Environmental Consultant may verify the authenticity of the hauler's permit with the proper authority.
- E. The Hauler, with the Contractor and the Environmental Consultant, shall inspect all material in the transport container prior to taking possession and signing the Asbestos Waste Manifests.

4.2 WASTE STORAGE CONTAINERS

- A. All waste containers shall be fully enclosed and lockable (i.e. enclosed dumpster, trailer, etc.). No open containers will be permitted on-site (i.e. open dumpster with canvas cover, etc.) unless specifically permitted by applicable regulation or a Site Specific Variance. When asbestos contaminated waste must be kept on the work site overnight or longer, it shall be double bagged and stored in accordance with Federal, State, and local laws.
- B. The Environmental Consultant shall verify that the waste storage container and/or truck tags (license plates) match that listed on the New York State Department of Environmental Conservation Part 364 permit. Any container not listed on the permit shall be removed from the site immediately.
- C. The container shall be plasticized and sealed with two (2) layers of 6 mil polyethylene. Once on site, it shall be kept locked at all times, except during load out. The waste container shall not be used for storage of equipment or contractor supplies.
- D. While on-site, the container shall be labeled with EPA Danger signage:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

- E. The New York State Department of Environmental Conservation Asbestos Hauler's Permit number shall be stenciled on both sides and back of the container.
 - F. The container is not permitted to be loaded unless it is properly plasticized, has the appropriate danger signage affixed, and has the permit number appropriately stenciled on the container.
 - G. Waste generated off-site is not permitted to be brought onto the Project site and loaded into the waste container.
 - H. All asbestos waste removed from the project site shall be transported directly to the disposal site without any additional waste being added to the container during transport.
- 4.3 OWNER'S AND HAULER'S ASBESTOS WASTE MANIFESTS
- A. An Asbestos Waste Manifest shall be provided to the Owner and shall be utilized in conjunction with the Asbestos Hauler's Manifest.
 - B. The Owner's Manifest and the Hauler's Manifest shall be completed by the Contractor and verified by the Environmental Consultant that all the information and amounts are accurate and the proper signatures are in place.
 - C. The Manifests shall have the appropriate signatures of the Environmental Consultant, the Contractor, and the Hauler representatives prior to any waste being removed from the site.
 - D. Copies of the completed Owner's Manifest and the Hauler's Manifest shall be retained by the Environmental Consultant and the Contractor and shall remain on site for inspection.
 - E. Upon arrival at the Disposal Site, the Owner's Manifest and the Hauler's Manifest shall be signed by the Disposal Facility operator to certify receipt of ACM covered by the manifest.
 - F. The Disposal Facility operator shall return the original Owner's Manifest and the Hauler's Manifest to the Contractor.
 - G. The Contractor shall forward copies of the Owner's Manifest and the Hauler's Manifest to the Environmental Consultant within 14 days of the waste container being removed from the site. Failure to do so may result in payment being withheld from the Contractor.
 - H. The Contractor shall utilize the Waste Disposal Log. This log shall be maintained by the Project Supervisor and shall be kept on site at all times.

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- I. All waste disposal manifests and disposal logs shall be submitted by the Contractor to the Owner with the final close-out documentation.

Appendix 'A' – Insepection Reports

LIMITED RENOVATION SURVEY
FOR
ASBESTOS CONTAINING MATERIALS; LEAD BASED PAINT & PCB'S
PERFORMED AT:

**Meadow Pond Elementary School
185 Smith Ridge Road
South Salem, New York 10590**

AS PREPARED BY:
Adelaide Environmental Health Associates
1511 Route 22 – Suite C-24
Brewster, NY 10509
845-278-7710

See Section 003001

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Appendix 'B'

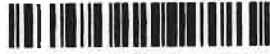
Project Designer Certification

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

PAUL CHECCO
CLASS(EXPIRES)
I PD (09/24)

CERT# 23-61KFG-SHAB
DMV# 748856015

MUST BE CARRIED ON ASBESTOS PROJECTS



01213 007012356 71

IF FOUND, RETURN TO:
NYSDEL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12226

SECTION 033000 – CAST IN PLACE CONCRETE FOR SITEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and Division 01 General Requirements apply to this section.

1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement the following:
 - 1. Walkways.
- B. Related Sections include other Division 2 Sections.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 4. Admixtures.
 - 5. Curing compounds.
 - 6. Applied finish materials.
 - 7. Bonding agent or epoxy adhesive.
 - 8. Joint fillers.
 - 9. Detectable warning strips.
- D. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
- C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.
- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.6 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. 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 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
 1. Use flexible or curved forms for curves with a radius 100 feet (30.5 m) or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:
 - 1. Portland Cement: ASTM C 150, Type I or II gray.
- B. Normal-Weight Aggregates: ASTM C 33, Class [4S] [4M] coarse aggregate, uniformly graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar pavement applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Provide IPANEX concrete waterproofing admixture (or approved equal) in all exterior concrete flatwork.

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

1. Available Products:

- a. Axim Concrete Technologies; Cimfilm.
- b. Burke by Edeco; BurkeFilm.
- c. ChemMasters; Spray-Film.
- d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
- e. Dayton Superior Corporation; Sure Film.
- f. Euclid Chemical Company (The); Eucobar.
- g. Kaufman Products, Inc.; Vapor Aid.
- h. Lambert Corporation; Lambco Skin.
- i. L&M Construction Chemicals, Inc.; E-Con.
- j. MBT Protection and Repair, ChemRex Inc.; Confilm.
- k. Meadows, W. R., Inc.; Sealtight Evapre.
- l. Metalcrete Industries; Waterhold.
- m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
- n. Sika Corporation, Inc.; SikaFilm.
- o. Symons Corporation; Finishing Aid.
- p. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.

- E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

1. Available Products:

- a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
- b. Burke by Edoko; Aqua Resin Cure.
- c. ChemMasters; Safe-Cure Clear.
- d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
- e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
- f. Euclid Chemical Company (The); Kurez DR VOX.
- g. Kaufman Products, Inc.; Thinfilm 420.
- h. Lambert Corporation; Aqua Kure-Clear.
- i. L&M Construction Chemicals, Inc.; L&M Cure R.
- j. Meadows, W. R., Inc.; 1100 Clear.
- k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
- l. Symons Corporation; Resi-Chem Clear.
- m. Tamms Industries Inc.; Horncure WB 30.
- n. Unitex; Hydro Cure 309.
- o. Vexcon Chemicals, Inc.; Certi-Vex EnvioCure 100.

- p. Tamms Industries, Inc.; Horncure 200-W.
- q. Unitex; Hydro White.
- r. Vexcon Chemicals, Inc.; Certi-Vex Enviocure White 100.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4,000 psi (20.7 MPa).
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45
 - 3. Slump Limit: 4" (100 mm) plus or minus 1 inch (25 mm).
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - 1. Air Content: 6 percent plus or minus 1.5 percent for 3/4-inch (19-mm) nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use plasticizing and retarding admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.
1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For concrete mixes of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 2. For concrete mixes larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
 - 2. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch (13 mm) require correction according to requirements in Section 31 20 00 "Earth Moving."
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap of adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
 - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
 - 2. Provide tie bars at sides of pavement strips where indicated.
 - 3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
 - 1. Locate expansion joints at intervals of 30 feet, unless otherwise indicated.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - 6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch (6-mm) radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site.
- F. Do not add water to fresh concrete after testing.
- G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Engineer.
- J. Screed pavement surfaces with a straightedge and strike off.
- K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- L. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
- M. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.
- N. When adjoining pavement sections are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- O. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 2. Do not use frozen materials or materials containing ice or snow.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.
- P. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
 2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or

adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch (6 mm).
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unlevelled straightedge not to exceed 1/4 inch (6 mm).
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch (25 mm).
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch (6 mm).
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch (13 mm).
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches (6 mm per 300 mm).
8. Joint Spacing: 3 inches (75 mm).
9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
10. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports at contractor's expense.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mix placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.
- G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

22 March 2024
Issue for Bid

Katonah-Lewisboro Union Free School District
Additions and Alterations to Meadow Pond Elementary School
SED No. 66-01-01-03-0-007-016

END OF SECTION 033000

SECTION 035416 - HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes hydraulic-cement-based underlayment for use below interior floor coverings.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.
- C. Manufacturer Certificates: Signed by manufacturers of both underlayment and floor covering system certifying that products are compatible.
- D. Qualification Data: For Installer.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.
- B. Product Compatibility: Manufacturers of both underlayment and floor covering system certify in writing that products are compatible.
- C. Mockups: Apply hydraulic-cement-based underlayment mockups to demonstrate surface finish, bonding, texture, tolerances, and standard of workmanship.
 - 1. Apply mockups approximately 100 sq. ft. (9 sq. m) in area in location indicated or, if not indicated, as directed by Architect.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 00.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature and humidity, ventilation, and other conditions affecting underlayment performance.
 - 1. Place hydraulic-cement-based underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F (10 and 27 deg C).

1.6 COORDINATION

- A. Coordinate application of underlayment with requirements of floor covering products, including adhesives, specified in Division 09 Sections, to ensure compatibility of products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Ardex, Inc.; K-15 Self-Leveling Underlayment Concrete.
 - 2. Dayton Superior Specialty Chemical Corp.; Level Layer I
 - 3. Mapei Corporation; Ultraplan I Plus

2.2 HYDRAULIC-CEMENT-BASED UNDERLAYMENTS

- A. Underlayment: Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thicknesses of 1/8 inch (3 mm) and that can be feathered at edges to match adjacent floor elevations. Product shall also be capable of being poured/pumped monolithically (rather than room-by-room).
 - 1. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
 - 2. Compressive Strength: Not less than 4100 psi (28 MPa) at 28 days when tested according to ASTM C 109/C 109M.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm); or coarse sand as recommended by underlayment manufacturer.
 - a. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required
 - 4. Water: Potable and at a temperature of not more than 70 deg F (21 deg C).
- B. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance.
 - 1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond. Perform moisture tests recommended by manufacturer and as follows.
 - 1. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/100 sq. m) in 24 hours.
 - 2. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have relative humidity level measurement acceptable to manufacturer.
- C. Nonporous Substrates: For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond, and prepare surfaces according to manufacturer's written instructions.
- D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 - 2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
 - 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
 - 4. Install perimeter isolation strip along the base of partitions prior to installation of topping. Cut isolation strip flush with finished floor.
 - 5. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- B. Apply underlayment to produce uniform, level surface.

1. Apply a final layer without aggregate to produce surface.
 2. Feather edges to match adjacent floor elevations.
- C. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- D. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- E. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.
- 3.4 PROTECTION
- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 035416

SECTION 042000 – UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
1. Face brick.
 2. Mortar and grout.
 3. Ties and anchors.
 4. Miscellaneous masonry accessories.
 5. Embedded flashing.
 6. Cavity-wall insulation.
- B. Products furnished, but not installed, under this Section include the following:
1. Mortar and grout for cast stone trim installed under Division 04 Section "Cast Stone".
 2. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 05 Section "Structural Steel Framing."
- C. Products installed, but not furnished, under this Section include the following:
1. Steel lintels and shelf angles for unit masonry, furnished under Division 05 Section "Metal Fabrications."
 2. Manufactured reglets in masonry joints for metal flashing, furnished under Division 07 Section "Sheet Metal Flashing and Trim."
 3. Hollow-metal frames in unit masonry openings, furnished under Division 08 Section "Hollow Metal Doors and Frames."

1.2 ACTION SUBMITTALS

- A. Product Data: For each different masonry unit, mortar material, accessory, and other manufactured product specified.
- B. Samples for Initial Selection: For the following:
1. Colored mortar samples in small-scale form showing the full range of colors and textures available for each different exposed mortar color required.
- C. Samples for Verification: For the following:
1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 2. Colored mortar samples, for each mortar color required, showing the full range expected in the finished construction. Make samples using the same sand and

mortar ingredients to be used on Project. Label samples to indicate type and amount of colorant used

3. Weep holes/vents in color to match mortar color
4. Accessories embedded in the masonry.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
 1. Each type of masonry unit required. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
 2. Mortar complying with property requirements of ASTM C 270.
- C. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 1. Each type of masonry unit required.
 - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
 2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 3. Each type and size of anchor, tie, and metal accessory.

1.4 QUALITY ASSURANCE

- A. Masonry Standard: Comply with requirements of "Specifications for Masonry Structures, ACI 530.1/ASCE 6/TSM 602" published by the American Concrete Institute, except when more stringent requirements are specified and as modified by the requirements of these Contract Documents.
 1. Revise ACI 530.1/ASCE 6/TSM 602 to exclude Article 1.5; Subparagraphs 1.1 C.1 through 4, and Subparagraphs 3.3 E.1 through 5.
- B. Installer Qualifications: Engage an experienced installer who has 10 years experience as a journeymen mason, and who has completed masonry similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
 1. A minimum of one skilled journeyman mason shall be present at all times during masonry erection and shall personally direct the work.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these

characteristics, through one source from a single manufacturer for each product required.

- E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- F. Mockups: Before installing unit masonry, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Final approval of brick bonding pattern, brick color and texture and mortar color and texture will be made based on acceptance of mock-up. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Locate mockup in the locations as directed by Architect.
 - 2. Build mockups containing the following types of masonry approximately 96 inches long by 48 inches high by full thickness, including face and backup wythes and accessories. Include a sealant-filled joint at least 16 inches long in the mockup.
 - a. Typical exterior masonry-veneer wall complete with back-up, reinforcing/ties, insulation, flashing, and weep holes. Demonstrate all types of brick patterns to be used in the Work in the mock-up. Include cast stone trim units in the mock-up.
 - 3. Re-prepare mock-ups as required to obtain Architect's approval.
 - 4. Protect accepted mockups from the elements with weather-resistant membrane.
 - 5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 6. Remove and reconstruct mockups as required to obtain Architect's approval.
 - 7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Coordination."
- H. Reference Standards: Comply with Brick Institute of America (BIA) and Masonry Institute of America (MIA) handbooks/Manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three (3) days after building masonry walls or columns
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in Part 1.8 C. of ACI 530.1/ASCE 6/TMS 602.
 - 1. Do not lay masonry units that are wet or frozen.
 - 2. Remove masonry damaged by freezing conditions.
- E. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- F. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Comply with cold-weather construction requirements contained in Part 1.8 D. of ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and wind breaks and use cooled materials as required.
 - 1. When ambient temperature exceeds 100 deg F (38 deg C), or 90 deg F (32 deg C) with a wind velocity greater than 8 mph (13 km/h), do not spread mortar beds more than 48 inches (1200 mm) ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 BRICK

- A. General: Provide shapes indicated and as follows for each form of brick required:
 - 1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.
 - 2. Provide lipped brick at steel relieving angles as indicated on drawings.
- B. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - 1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- C. Face Brick: ASTM C 216, Grade SW, Type FBS, and as follows:
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
 - 2. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
 - 3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 - 4. Type: As selected by Architect.
 - 5. Sizes: Modular: 3-5/8" w x 2-1/4" h x 7-5/8" l
 - 6. Colors: As selected by Architect.
 - 7. Texture: As selected by Architect.

2.2 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color cement.
 - 1. For cast stone and brickwork, provide natural color or white cement as required to produce required mortar colors.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
- D. Masonry Cement: Not permitted.
- E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
 - 1. For colored mortar, provide natural sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar colors.

- F. Aggregate for Grout: ASTM C 404.
- G. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars
- H. Water: Potable.

2.3 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.
- B. Stainless Steel Wire: ASTM A580/A580M, Type 304.
- C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
- D. Stainless Steel Bars: ASTM A276 or ASTM A666, Type 304.
- E. Mill Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 641 (ASTM A 641M), Class 1 coating.
- F. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
- G. Steel Sheet, Galvanized after Fabrication: ASTM A 366/A 366M cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153
- H. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.4 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section: Crimped 1/4-inch- (6.4-mm-) diameter, stainless steel anchor section for welding to steel.
 - 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.1875-inch- (4.8-mm-) stainless steel.
 - 3. Basis of Design Product: Hohmann & Barnard 359-FH Weld On Tie with VBT Vee Byna-Tie or one of the following, or equal.
 - a. Type I Weld On Anchor and 1100 Tie by Wire Bond.
 - b. 315-B Weld On Anchor and 316 Triangle Tie by Heckmann Building Products

2.5 ADJUSTABLE MASONRY-VENEER ANCHORS

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing or insulation to wood or metal studs, and as follows:

1. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
- B. Screw-Attached, Masonry-Veneer Anchors for Metal Stud Back-up Construction: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:
1. Anchor Section: Rib-stiffened, sheet metal plate with 9/32" diameter screw holes top and bottom; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section.
 2. Wire Tie Section: Rectangular- shaped wire tie sized to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face.
 3. Fabricate sheet metal anchor sections and other sheet metal parts from 14 gauge (1.9 mm) thick, stainless steel sheet.
 4. Fabricate wire tie sections from 3/16 inch- (4.8-mm-) diameter, stainless steel wire.
 5. Basis of Design Product: One of the following or equal:
 - a. RJ-711;. Wire-Bond
 - b. HB-213; Hohmann & Barnard, Inc.
 - c. #213 Anchor with #282 Tie; Heckmann Building Products
- C. Stainless-Steel Drill Screws for Steel Studs: Either made from Type 410 stainless steel or made with a carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 (4.8-mm) diameter by length required to penetrate steel stud flange by not less than three exposed threads
- D. Expansion Bolt-Attached, Masonry-Veneer Anchors for Existing Masonry or Concrete Back-up Construction (and where dovetail slots have not been installed in concrete): Units consisting of a wire tie section and a metal anchor section complying with the following requirements:
1. Anchor Section: Rib-stiffened, sheet metal plate with 7/16" diameter bolt hole in the center for use with brass expansion bolt; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section.
 2. Wire Tie Section: Rectangular- shaped wire tie sized to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face.
 3. Fabricate sheet metal anchor sections and other sheet metal parts from 14 gauge (1.9-mm-) thick, stainless steel sheet.
 4. Fabricate wire tie sections from 3/16-inch- (4.8-mm-) diameter, stainless steel wire.
 5. Basis of Design Product: HB-5213 by Hohmann & Barnard, Inc. or comparable system/product by one of the following:
 - a. Wire-Bond
 - b. Heckmann Building Products (Pos-I-Tie system)
- E. Brass Expansion Bolt for Existing Masonry or Concrete Back-up Construction: Masonry fastener for fastening anchors to concrete, block, brick and into mortar joints complying with the following requirements:

1. Internal Bolt: ¼" diameter – 20, Type 304 stainless steel.
2. Stainless Steel Washer: ¾" OD, Type 18-8 stainless steel.
3. Knurled Expansion Sleeve and Expander Cone: Brass 260 alloy.
4. Fixture Clearance Hole: 7/16" diameter
5. ANSI Drill Bit Size: 3/8" diameter
6. Basis of Design Product: 523 Brass Expansion Bolt by Hohmann & Barnard, Inc. or equal system/product by one of the following:
 - a. Wire-Bond
 - b. Heckmann Building Products

2.6 RIGID ANCHORS

A. General: Fabricate from steel bars as follows:

1. 1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm) thick by 24 inches (600 mm) long, with ends turned up 2 inches (50 mm) or with cross pins.
2. Finish: Hot-dip galvanized to comply with ASTM A 153.

2.7 MISCELLANEOUS ANCHORS

A. Postinstalled Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Type: Chemical anchors.
2. Type: Expansion anchors.
3. Corrosion Protection (Indoor): Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).
4. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4) for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.
5. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
6. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

2.8 EMBEDDED FLASHING MATERIALS

A. Concealed Adhered Masonry Flashing: Provide stainless steel fabric laminated sheet flashing overlapping a full bed depth stainless steel drip as follows:

1. Basis of Design Product: Provide specified product of Hohmann & Barnard or equal products by York or Wire-Bond.
2. Sheet-Metal Drip Flashing: Fabricate from 22 gage stainless steel with the drip edge hemmed approximately 3/16-inch and a 2 inch turn-up, as indicated on Drawings.
3. Termination Bar: Stainless steel.

4. Self-Adhering Stainless Steel Fabric Laminated Sheet Flashing: Manufacturer's standard composite membrane consisting of a polymeric film laminated to a .003 inch stainless steel sheet, with a pressure-sensitive, clear adhesive; non-asphaltic; Mighty-Flash – SA Self-Adhering Stainless Steel Fabric Flashing by Hohmann & Barnard or equal. Verify compatibility with air barrier system that sheet flashing contacts.
 - a. Primer: Flashing manufacturer's standard product or product recommended by flashing manufacturer for bonding flashing sheets to masonry and concrete; Primer – SA by Hohmann & Barnard or equal.

B. Metal Flashing: Provide metal flashing as follows:

1. Stainless Steel: ASTM A 240/A 240M, Type 304, 26 gauge 0.016 inch (0.40 mm) thick.
2. Fabricate drip edge in one continuous length, 4 inches wide, with a hemmed outer edge condition held flush with face of finished masonry.

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is partly exposed and is indicated to terminate at the wall face, use concealed flexible flashing with a metal drip edge.
3. Where flashing is fully concealed, use flexible flashing.

2.9 CAVITY-WALL INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type X, 15-psi (104-kPa) minimum compressive strength, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84. .

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. DiversiFoam Products; CertaFoam 15.
 - b. DuPont; Dow Styrofoam Brand Cavitymate.
 - c. Owens Corning; Foamular CW15 Square Edge.
2. Thickness: As indicated on Drawings.
3. Edges: Square edge.

B. Tape for Sealing Joints in Insulation: Type recommended by insulation board manufacturer for application indicated.

C. Adhesive: Type recommended by insulation board manufacturer for application indicated

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

- B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- C. Wicking Material: Absorbent rope, made from UV-resistant synthetic fiber, 1/4 to 3/8 inch (6 to 10 mm) in diameter, in length required to produce 2-inch (50-mm) exposure on exterior and 18 inches (450 mm) in cavity. Use only for weeps.
 - 1. Application: At cast stone trim, and other locations as indicated
- D. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe.
 - 1. Color: Match mortar color.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equivalent:
 - a. WeepVent by Mortar Net Solutions.
 - b. CavClear Weep Vents.
 - c. Weep Mesh by Advanced Building Products
 - 3. Application: At brick veneer.
- E. Cavity Drainage Material: 2-inch- (50-mm-) thick, reticulated, nonabsorbent mesh, made from polyethylene strands with 90% open plastic mesh configuration, and dovetail shape to maintain drainage at weep holes without being clogged by mortar droppings.
 - 1. Basis of Design Product: Provide one of the following or equivalent:
 - a. Mortar Net by Mortar Net Solutions
 - b. Mortar Trap by Hohmann & Barnard, Inc.
 - c. ProNet by Masonpro
- F. Cavity Drainage Material: 3/4-inch- (50-mm-) thick, reticulated, nonabsorbent mesh, made from polyethylene strands with 90% open plastic mesh configuration.
 - 1. Use in cavities with masonry back up and with less than 1 1/8" clear cavity only.
 - 2. Product: Subject to compliance with requirements, provide CavClear Masonry Mat manufactured by CavClear.

2.11 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup (0.14-L) dry measure tetrasodium polyphosphate and 1/2-cup (0.14-L) dry measure laundry detergent dissolved in 1 gal. (4 L) of water.
- B. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Products for Cleaning Unit Masonry: Subject to compliance with requirements, provide one of the following:
 - a. Cleaners for Red and Light-Colored Brick Not Subject to Metallic Staining with Mortar Not Subject to Bleaching: Sure Klean No. 600 Detergent; ProSoCo, Inc.
 - b. Cleaners for Red and Dark-Colored Brick Not Subject to Metallic Staining: Sure Klean No. 101 Lime Solvent; ProSoCo., Inc.
 - c. Cleaners for Brick Subject to Metallic Staining: Sure Klean Vana Trol; ProSoCo, Inc.

2.12 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
- B. Colored Mortar for Cast Stone and Brickwork: Produce mortar of color specified, and to match approved mock-ups by using selected ingredients. Do not alter specified proportions without Architect's approval.
 1. Use naturally colored aggregates to produce required mortar color to greatest extent possible, before adding pigments.
 2. Pigments: Where mortar pigments are used, do not exceed a pigment-to-cement ratio of 1:10 by weight.
 3. Color: As selected by Architect.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.
 1. Limit cementitious materials in mortar to portland cement and lime.
 2. For masonry below grade, in contact with earth, and where indicated, use Type M.
 3. For cast stone and brick units, use Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 2. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
 2. Verify that foundations are within tolerances specified.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION, GENERAL

- A. For cold-weather construction comply with requirements contained in ACI 530.1-05
- B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.
- C. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
- D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
- E. Cut masonry units with motor-driven saws to provide clean, sharp, un-chipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- F. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
1. Mix units from several pallets or cubes as they are placed.
- G. Wetting of Brick: Wet brick before laying if the initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying

3.3 CONSTRUCTION TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
- B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet (6 mm in 6 m), nor 1/2 inch (12 mm) maximum.
- C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), nor 1/2 inch (12 mm) maximum.

- D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, the following tolerances will apply.
1. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
 2. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
 3. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or one-fourth of nominal joint width, whichever is less.
 4. Variation in Plane between Adjacent Surfaces (Lipping): Do not exceed 1/16-inch (1.5-mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.
- E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm). Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
- F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Lay exposed masonry in running bond pattern unless otherwise indicated; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
1. As indicated on Drawings for brickwork.
- C. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- E. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
 - 1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.
- C. Collar Joints in Masonry: Fill the vertical, longitudinal joint between wythes solidly with grout for exterior walls noted, do not fill insulated cavity walls.

3.6 CAVITIES

- A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.
 - 1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.
- B. Apply air barrier to face of backup to comply with Section 072726 "Fluid-Applied Membrane Air Barriers."
- C. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches (300 mm) o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
 - 1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.7 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 - 1. Provide an open space not less than 1 inch (25 mm) in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 16 inches (406 mm) o.c. horizontally, with not less than 1 anchor for each 1.77 sq. ft. (0.16 sq. m) of wall area.

3.8 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing or solid backup with masonry-veneer anchors to comply with the following requirements:
1. Fasten each anchor section through sheathing to metal wall framing with two metal screw fasteners of type indicated.
 2. Fasten each anchor section to CMU or concrete back-up with to expansion bolt anchors
 3. Embed tie sections in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.
 4. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 5. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 16 inches (406 mm) o.c. horizontally, with not less than 1 anchor for each 1.77 sq. ft. (0.16 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around the perimeter.

3.9 CONTROL AND EXPANSION JOINTS

- A. General: Install vertical control and expansion joints at one side of all doorways and at wall locations maximum 25 ft. o.c., and where indicated. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry with preformed control-joint gaskets designed to fit standard sash block.
- C. Form expansion joints in brick made from clay or shale by building in joint fillers not less than 3/8 inch (10 mm) for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants." Keep joint free and clear of mortar.
- D. Build in horizontal, pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants."
1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

3.10 LINTELS

- A. Install steel lintels where indicated.
- B. Provide minimum bearing of 8 inches (200 mm) at each jamb, unless otherwise indicated.

3.11 FLASHING, WEEP HOLES, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

- B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - C. Install flashing as follows:
 - 1. At masonry-veneer walls, apply flexible flashing over the air barrier to a height of 6" above the top of the cavity drainage material and secure flashing top edge with a termination bar to substrate. Apply sealant to top of termination bar. Install a 6" wide strip of compatible self-adhesive membrane over the installed termination bar and sealant, centered on the termination bar. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge
 - 2. At lintels and shelf angles, extend flashing a minimum of 4 inches (100 mm) into masonry at each end. At heads and sills, extend flashing 4 inches (100 mm) at ends and turn flashing up not less than 2 inches (50 mm) to form a pan.
 - 3. Extend sheet metal flashing 1/2 inch (13 mm) beyond face of masonry at exterior and turn flashing down to form a drip.
 - 4. Install end dams at all window and door flashing locations.
 - D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:
 - 1. Use mesh weep vents to form weep holes at brick.
 - 2. Use wicking material to form weep holes above flashing under cast stone sills. Turn wicking down at lip of sill to be as inconspicuous as possible
 - 3. Space weep holes 24 inches (600 mm) o.c.
 - 4. Place cavity drainage material immediately above flashing in cavities.
 - E. Install vents in vertical head joints at the top of each continuous cavity at spacing indicated. Use plastic weep hole/vents to form vents.
 - F. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- 3.12 REPAIRING, POINTING, AND CLEANING
- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
 - B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.
 - C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
 5. Clean brick masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 042000

SECTION 047200 – CAST STONE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Cast stone sills, copings, trim, caps, banding, and other shapes indicated on drawings.
2. Stainless steel support and retention connections for cast stone, including all ties, anchors, and necessary shims to supporting structure.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for mortar and grout.

1.2 DEFINITIONS

A. Cast Stone: Architectural precast concrete building units intended to simulate natural cut stone.

B. Arris: The sharp edge of a Cast Stone Unit.

1.3 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for cast stone units.

B. Design Mixes: For each different mix.

C. Shop Drawings: Detail fabrication and installation of cast stone units.

E. Samples for Initial Selection: For colored mortar, showing the full range of colors available.

F. Samples for Verification:

1. For each mortar color required, showing the full range expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label samples to indicate type and amount of colorant used.
2. For each color and texture of cast stone required, 10-inches (250 mm) square in size.

G. Full-Size Samples: For each type of cast stone trim unit required. Make available for Architect's review at Project site before installing cast stone.

1. Approved Samples may be installed in the Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Fabricator.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of cast stone with requirements indicated.
- C. Certification that the materials incorporated in this Work are free from hazardous contaminants.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in manufacturing cast stone units similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to manufacture required units.
 - 1. Fabricator is a producing member of the Cast Stone Institute.
- B. Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- C. Source Limitations for Cast Stone: Obtain cast stone units through one source from a single manufacturer.
- D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- E. Mock-ups for Trim Units: Incorporate cast stone units in mock-up specified in Division 04 Section "Unit Masonry".
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Pack, handle, and ship cast stone units in suitable packs or pallets.
 - 1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
 - 2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.
- B. Store installation materials on elevated platforms, under cover, and in a dry location.
- C. Store mortar aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.7 COORDINATION

- A. Coordinate production and delivery of cast stone with unit masonry work to minimize the need for on-site storage and to avoid delaying the Work.
- B. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Provide products manufactured by one of the following:
 - 1. Arriscraft
 - 2. American ArtStone.
 - 3. Continental Cast Stone Manufacturing, Inc.
 - 4. Corinthian Cast Stone
 - 5. Stone Legends Inc.

2.2 CAST STONE MATERIALS

- A. General: Comply with ASTM C 1364 and the following:
- B. Portland Cement: ASTM C 150, Type I, containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
- C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures.
- D. Fine Aggregates: Manufactured or natural sands complying with ASTM C 33, gradation as needed to produce required textures.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
- F. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M.
 - 1. Epoxy Coating: ASTM A 775/A 775M.
 - 2. Galvanized Coating: ASTM A 767/A 767M.
- G. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 276 or ASTM A 666, Type 304.

2.3 STAINLESS-STEEL SUPPORT AND CONNECTION MATERIALS

- A. Anchors: Stainless steel, ASTM A 666, Type 304, of temper and diameter required to support loads without exceeding allowable design stresses.

- B. Accessories: Provide clips, hangers, plastic shims, and other accessories required to install cast stone units.
- C. Provide stainless steel support and connection materials for exterior cast stone, unless otherwise indicated on Drawings.

2.4 CAST STONE UNITS

- A. Provide cast stone units complying with ASTM C 1364.
 - 1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364.
- B. Physical Properties:
 - 1. Compressive Strength: Minimum 6,500 psi when tested per ASTM C 1194.
 - 2. Absorption: Maximum 6% when tested per ASTM C 1195.
 - 3. Freeze Thaw: Maximum 5% when tested per C1364.
 - 4. Unit Density: Minimum 130 pcf when tested per ASTM C642.
 - 5. Cast stone units installed at grade shall be suitable for use at or below grade.
- C. Reinforce units as indicated and as required by ASTM C 1364. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches (38 mm) of material. Minimum coverage shall be twice the diameter of the bars.
 - 1. Area of reinforcement in panels greater than 12" wide shall be not less than 1/4 percent of the cross section area when steel is specified.
- D. Fabrication Method: Use a Vibrant-Tamp placement method or machine manufacture using a zero slump mixture to achieve desired appearance and physical properties.
- E. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
 - 1. Slope exposed horizontal surfaces at least 1:12, unless otherwise indicated.
 - 2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 - 3. Provide drips on projecting elements, unless otherwise indicated.
- F. Fabricate panels and trim members to size, shape and thicknesses indicated on Drawings for each application.
 - 1. Fabricate trim units to match existing.
- G. Cure and finish units as follows:
 - 1. Cure units in totally enclosed curing room under dense fog and water spray at 95 percent relative humidity for 24 hours.
 - 2. Yard cure units until the sum of the mean daily temperatures for each day equals or exceeds 350 deg F.

3. Acid etch units to remove cement film from surfaces indicated to be finished.

H. Color and Texture: Exposed surfaces shall exhibit a fine-grained texture similar to natural stone; no bug-holes or air voids shall be permitted.

1. Color and Texture: Smooth texture and light grey color; similar to grey limestone.

2.5 MORTAR MATERIALS

A. Provide mortar materials that comply with Division 04 Section "Unit Masonry."

2.6 ACCESSORIES

A. Anchors for Cast Stone Trim: Units fabricated with tabs or dowels designed to engage kerfs or holes in cast stone trim units and holes for fastening to framing of type as indicated, size as required for project conditions, fabricated from stainless steel complying with ASTM A 276 or ASTM A 666, Type 304.

B. Dowels: Round stainless-steel bars complying with ASTM A 276, Type 304, 1/2-inch (12-mm) diameter.

C. Cast Stone Cleaner: Sure Kleen #600 by ProSoCo Products Inc., or equal.

D. Through wall flashing, weep wicks and other accessories are specified in Division 04 Section "Unit Masonry."

2.7 MORTAR MIXES

A. Provide ASTM C 270, Type N colored mortar. Comply with requirements in Division 04 Section "Unit Masonry" for mortar mixes.

2.8 SOURCE QUALITY CONTROL

A. Employ an independent testing agency to sample and test cast stone units according to ASTM C 1364.

1. Include testing for freezing and thawing resistance.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cast stone.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with Cast Stone Institute recommendation for installation of cast stone units.
- B. Set cast stone as indicated on Contract Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
- C. Drench units with clear water just before setting.
- D. Set units in full bed of mortar with full head joints, unless otherwise indicated. Build anchors and ties into mortar joints as units are set.
 - 1. Fill dowel holes and anchor slots with mortar.
 - 2. Fill collar joint solid as units are set.
 - 3. Build concealed flashing into mortar joints as units are set.
 - 4. Leave head joints open in coping and other units with exposed horizontal surfaces. Keep joints clear of mortar, and rake out to receive sealant.
- E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch (19 mm). Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
- F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch (10 mm). Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- H. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - 1. Sealing joints is specified in Division 07 Section "Joint Sealants."
 - 2. Keep joints free of mortar and other rigid materials.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
- B. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or one-fourth of nominal joint width, whichever is less.
- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not exceed 1/16-inch (1.5-mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.4 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses. Remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 4. Clean cast stone in conformance cleaner manufacturer's directions.

END OF SECTION 047200

SECTION 054000 – COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior non-load bearing steel stud framing.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections and miscellaneous steel framing.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Structural Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Non-Load Bearing Studs for Masonry Veneers: Horizontal deflection of 1/600 of the horizontally projected span.
 - b. Non-Load Bearing Studs at Other Materials: Horizontal deflection of 1/360 of the horizontally projected span.
3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

C. Cold-Formed Steel Framing Design Standards:

1. Wall Studs: AISI S211.
2. Headers: AISI S212.
3. Lateral Design: AISI S213.

D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

1.3 SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the professional engineer licensed in the State of New York, who is responsible for their preparation.
- C. Welding certificates.
- D. Qualification Data: For professional engineer.
- E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- F. Research/Evaluation Reports: For cold-formed metal framing.

1.4 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Professional Engineer Qualifications: A professional engineer who is licensed in the State of New York and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- C. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- D. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

- E. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - F. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
 - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
 - G. Preinstallation Conference: Conduct conference at Project site.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
 - B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ClarkDietrich Building Systems.
 - 2. MarinoWare; a division of Ware Industries.
 - 3. Super Stud Building Products, Inc.

2.2 MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: ST33H (ST230H) and ST50H (ST340H) as required by structural performance.
 - 2. Coating: G60 (Z180).

2.3 EXTERIOR AND INTERIOR NON LOAD BEARING WALL FRAMING

- A. Built-up Members: Built-up members of manufacturer's standard C-shaped steel section, with stiffened flanges, nested into a U-shaped steel section joist track, with unstiffened flanges; unpunched; of web depths indicated; and as follows:
 - 1. Minimum Base-Metal Thickness: 16 gauge minimum, unless otherwise indicated Drawings.

2. Flange Width: 1-5/8 inches (41 mm), minimum.

2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.
 4. Anchor clips.
 5. End clips.
 6. Gusset plates.
 7. Hole reinforcing plates.
 8. Backer plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts headless, hooked bolts headless bolts, with encased end threaded, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C mechanically deposition according to ASTM B 695, Class 50.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.
- F. Spray Foam Insulation/Sealer: Low expansion type, recommended by manufacturer for intended use.

2.7 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
 - 4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

3.3 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
 1. Cut framing members by sawing or shearing; do not torch cut.
 2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

- a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- I. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
1. Stud Spacing: 16 inches (406 mm).
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure as required on Drawings to prevent transfer of vertical loads while providing lateral support.
1. Install single-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to studs and anchor to building structure.
 4. Connect drift clips to cold formed metal framing and anchor to building structure.

- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
 - 1. Install additional row of horizontal bridging in curtain wall stud beneath deflection track when curtain wall studs are not fastened to an additional top track.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system

3.5 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds and screw connections will be subject to testing and inspecting.
- C. Testing agency will report test results within 24 hours and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- F. Inspect all prefabricated trusses before installation.

3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Loose steel lintels.
 2. Shelf angles.
 3. Steel framing and supports for ceiling hung equipment, ceiling hung curtains, ceiling hung partitions and other items indicated on Drawings.
 4. Steel framing and supports for mechanical and electrical equipment.
 5. Steel framing and supports for part height partitions.
 6. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 7. Aluminum pencil-proof bar gratings

1.2 ACTION SUBMITTALS

- A. Product Data: For all fabricated products including the following:
1. Gratings.
- B. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- C. Samples for Verification: Sample of the following:
1. 6" square piece of each type of bar grating.

1.3 INFORMATIONAL SUBMITTALS

- A. Welding Certificates: Copies of certificates for welding procedures and personnel.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."
3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.6 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating.
- C. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads. For exterior installations and where indicated, provide pipe with hot-dip galvanized coating.
- D. Slotted Channel Framing: Cold-formed metal channels with flange edges returned toward web and with 9/16-inch- (14.3-mm-) wide slotted holes in webs at 2 inches (51 mm) o.c.

1. Width of Channels: 1-5/8 inches (41 mm).
 2. Depth of Channels: As indicated.
 3. Metal and Thickness: Galvanized steel complying with ASTM A 653/A 653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating; 0.108-inch (2.8-mm) nominal thickness.
 4. Finish: Unfinished.
- E. Malleable-Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).
- F. Gray-Iron Castings: ASTM A 48, Class 30 (ASTM A 48M, Class 200), unless another class is indicated or required by structural loads.
- G. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- H. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 PAINT

- A. Shop Primer for Interior Ferrous Metal: Modified oil-alkyd primer, Tnemec 88-559 or 10-1009, or equivalent. Primer shall be compatible with finish paint specified in Section 099100.
- B. Shop Primer for Galvanized Ferrous Metal: Polyamide epoxy primer, Tnemec F.C. Typoxy Series 27, or equivalent. Primer shall be compatible with finish paint specified in Section 099100.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- D. Shop Primer for Exterior Ferrous Metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat; Tnemec-Zinc 90-97; Tnemec Company, Inc.
- E. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FASTENERS

- A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built

into exterior walls, except as noted below. Select fasteners for type, grade, and class required.

- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36.
- D. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
- E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.
- G. Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M).
- H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1 (ASME B18.21.2M).
- I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
- J. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Shear and punch metals cleanly and accurately. Remove burrs.
- C. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
 - G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
 - H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
 - I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
 - J. Remove sharp or rough areas on exposed traffic surfaces.
 - K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- 2.6 ROUGH HARDWARE
- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.
 - B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers..
- 2.7 LOOSE STEEL LINTELS
- A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
 - B. Weld adjoining members together to form a single unit where indicated.

- C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches (200 mm), unless otherwise indicated.
- D. Galvanize loose steel lintels located in exterior walls.
- E. Shop prime and field paint all lintels, leave embedded portions of lintels unpainted.

2.8 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.
- B. Galvanize shelf angles to be installed in exterior walls.
- C. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.9 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.
- B. Fabricate units from structural-steel shapes, plates, tubes, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long at 24 inches (600 mm) o.c., unless otherwise indicated.
 - 3. Furnish inserts if units must be installed after concrete is placed.
- C. Fabricate supports for ceiling hung doors and panel partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on Shop Drawings.
- D. Fabricate framing and supports for solid surface countertops from cast iron and connectors as detailed on Drawings, for table legs.
- E. Galvanize miscellaneous framing and supports where indicated, and in exterior locations.

2.10 METAL GRATINGS

- A. Metal Bar Gratings: Form to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual"
 - 1. Aluminum Pencil Proof Linear Bar Grille/Diffuser: Extruded aluminum 7/32" fixed bars at 7/16" spacing, zero degree deflection. Bars shall be fixed and parallel in the long direction. Provide in 6 ft lengths. Provide end borders and mitered corners as required to close off ends.
 - a. Basis of Design Product: Model CT-PP-0 by Titus or equal.
 - b. Toe Kick Grille: Provide combination Type C1 and C5 frame and border with loose angles and cam nuts, no base flange.
 - c. Top Surface Grille: Provide Type 2 frame and border (3/4" border).
 - d. Finish: Black powder coat.
 - e. Application: Unit cabinet heaters.

2.11 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware..
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes indicated as unpainted, and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.
 - 1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
 - 2. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.
- B. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated at girders supported on concrete or masonry, install as specified above for setting and grouting bearing and leveling plates.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wood blocking, cants, furring, supports, and nailers.
2. Plywood backing panels.

1.2 DEFINITIONS

A. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NLGA - National Lumber Grades Authority.
3. SPIB - Southern Pine Inspection Bureau.
4. WCLIB - West Coast Lumber Inspection Bureau.
5. WWPA - Western Wood Products Association.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses.

- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.

1.5 QUALITY ASSURANCE

- A. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI).

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings..

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Provide dressed lumber, S4S, unless otherwise indicated.
 3. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, and Use Category UC3b for exterior construction not in contact with ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 2. The use of CCA preservative treated wood is prohibited.
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
- C. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

- D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
1. Use treatment that does not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency

2.4 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Furring.
 4. Sleepers
 5. Cants
- B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content and the following species: Mixed southern pine; SPIB.

- C. For concealed boards, provide lumber with 19 percent maximum moisture content of the following species and grades:

- 1. Spruce-pine-fir (south) or Spruce-pine-fir, Construction or 2 Common grade; NELMA, NLGA, WCLIB, or WWPA.

2.5 PLYWOOD PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch (12.7 mm) thick.

- 1. Paint before mounting of equipment.

- B. Miscellaneous Concealed Plywood: Exposure 1 sheathing, span rating to suit framing in each location, and thickness as indicated but not less than 1/2 inch (13 mm).

- 1. Provide fire-retardant-treated panels for interior locations unless indicated.
- 2. Provide preservative-treated panels for exterior locations unless indicated.

2.6 MISCELLANEOUS MATERIALS

- A. Fasteners:

- 1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- 2. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.7 ACCESSORY MATERIALS

- A. Weather Resistant Barrier: Asphalt-saturated organic felt, ASTM D 226, Type 1 (No. 15 asphalt felt), unperforated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

- C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- E. Use fasteners of appropriate type and length. Pre-drill members when necessary to avoid splitting wood.

3.2 PANEL PRODUCT INSTALLATION

- A. Fastening Methods: Fasten panels as indicated below:
 - 1. Plywood Backing Panels: Screw to supports.
 - 2. Miscellaneous Concealed Plywood Panels: Screw to supports.

3.3 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

END OF SECTION 061053

SECTION 061643 - GYPSUM SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Sheathing joint and penetration treatment.

B. Related Requirements:

1. Division 07 Section "Fluid-Applied Membrane Air and Moisture Barriers" for moisture-resistive barrier applied over wall sheathing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each gypsum sheathing product through one source from a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.5 SEQUENCING AND SCHEDULING

- A. Sequence installing sheathing with installing exterior cladding to comply with requirements indicated below:
1. Do not leave glass-mat gypsum sheathing board exposed to weather for more than 180 days.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory," or GA-600, "Fire Resistance Design Manual."

2.2 GYPSUM SHEATHING, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated

2.3 WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
 - 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. National Gypsum Company; Gold Bond e(2)XP.
 - b. United States Gypsum Co.; Securock.
 - c. Georgia Pacific; DensGlass
 - 2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
 - 3. Size: 48 by 96 inches (1219 by 2438 mm) or 48 by 120 inches (1219 by 3048 mm) for vertical installation.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C 954.

2.5 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.
 - 2. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.
 - 3. Sealants and tapes shall be compatible with air and moisture barrier specified in Section 072726

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with manufacturer's published instructions.
- D. Coordinate wall sheathing installation with air and moisture barrier installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
 - 3. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 - 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.
- D. Seal sheathing joints according to sheathing manufacturer's written instructions.
 - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

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Additions and Alterations to Meadow Pond Elementary School
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END OF SECTION 061643

SECTION 064020 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Plastic-laminate cabinets and casework.
2. Wood cabinets and casework, including built-in bookcases and cubbies.
3. Interior wood trim and rails
4. Wood bench seating.
5. Plastic laminate countertops.
6. Plastic laminate shelves.
7. Built-in storage unit with sliding whiteboard doors.

B. Scope: High Pressure Plam cabinets with Solid Surface tops / splashes unless noted otherwise

1. Library: Built in perimeter (under the windows) bookcases 2 shelves high x width shown on the Drawings x 12"d, Adjustable shelves 1" thick, in Maple
2. Library: Base and Upper cabinets with sink, in Maple.
3. Library Closet: Adjustable wall-mounted shelves, 15" d x length of closet on heavy duty standards.
4. STREAM Lab Closet: Adjustable wall-mounted shelves, 15" d x length of closet on heavy duty standards.
5. Library Whiteboard Closet: Sliding whiteboard doors, ceiling/floor mounted.
6. Library Bench Seating: Reading steps, L-shaped, 2 high in Maple
7. STREAM Lab: Upper and base cabinet with sink.
8. STREAM Lab: Base cabinet with plastic laminate top.
9. Security Office: Plastic laminate countertop
10. Kindergarten: Base cabinets with sink and 6" high back/side splash, in Oak

C. Related Work Specified Elsewhere:

1. Solid surface countertops are specified in Division 06 Section "Solid Surface Material Fabrications."

1.2 DEFINITIONS

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

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, including cabinet hardware and accessories, and finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips and clips, cabling and connectors, and attachment devices, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, wire management, and other items installed in architectural woodwork.
 - 4. Show locations of seams in countertops.
- C. Samples for Verification: For the following:
 - 1. Lumber with or for transparent finish, 50 sq. in. (300 sq. cm), for each species and cut, finished on 1 side and 1 edge.
 - 2. Wood-veneer-faced panel products with or for transparent finish, 8 by 10 inches (200 by 250 mm), for each species and cut. Include at least one face-veneer seam and finish as specified.
 - 3. Plastic-laminate-clad products, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish.
- D. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed architectural woodwork 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.
- B. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production and installation of interior architectural woodwork.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.
 - 1. Provide AWI Quality Certification Program certificate indicating that woodwork complies with requirements of grades specified.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.7 COORDINATION

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

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Low-Emitting Materials: All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI)
- C. Wood Species and Cut for Transparent Finish: Grade A White Oak or Maple, as scheduled, plain sawn/sliced.
 - 1. Matching: Solid stock shall be matched for color and grain; veneer faces shall be compatible in color with solid stock.
 - 2. Veneer Matching: Slip matched and balanced within panel.

3. Maple edge on casework shall match the approved submittal on maple door finish.
- D. Cabinet Interiors (Cabinets with Doors): Plastic laminate with 3 mm PVC edgebanding (kerf and adhesion installation) on shelves.
- E. Wood Products: Comply with the following:
1. Hardboard: Tempered, S1S, Class 1 minimum 1/4 inch and conforming to PS 58-73.
 2. Particleboard: Minimum 45 lb. density particleboard complying with requirements in ANSI A208.1, Grade M - 3i.
 3. Medium-Density Fiberboard: ANSI A208.2, Grade 130
 4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
 5. Hardwood Plywood and Face Veneers: HPVA HP-1.
- F. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
1. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semiexposed edges.
- G. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
1. Basis of Design Colors, Patterns and Finishes:
 - a. Library: Wilsonart Cenizo Cherry 8239-38
 - b. STREAM Lab Cabinets: Wilsonart Vapor Strandz 4939-K-18
 - c. Kindergarten: Wilsonart Blond Echo 7939K-18, Aeon Finish
 - d. Security Office Countertop: Wilsonart Handspun Pearl 2033-38
 2. Basis of Design Products: Wilsonart High Pressure Laminate or equal. by one of the following:
 - a. Formica Corporation.
 - b. Laminart.
 - c. Panolam Industries International, Inc.
- H. Sliding Whiteboard Doors: Interior sliding aluminum-framed door system with magnetic whiteboard laminate finish one side, bottom-rolling doors, door tracks and hardware.
1. Basis-of-Design Product: Provide RO44 Sliding Door System by Richelieu Hardware or equal, with the following attributes:
 - a. Bi-passing Doors: 3/4" thick plywood with laminate bonded to front surface and edges. Size and number as indicated on Drawings.
 - b. Door Panel Faces:
 - 1) Front and Edges: Plastic laminate magnetic whiteboard finish. Provide Formica M3091-90 Crystal White Magnetic, in Gloss, or equal.
 - 2) Rear: Backer sheet, finish as selected by Architect.

- c. Tracks: Clear anodized aluminum extrusions.
 - 1) Top Track: RM 030 upper dual upper guide track with track stopper and retaining device to resist door bounce back.
 - 2) Bottom Tracks: RM 022 dual bottom track with end covers as required.
 - d. Hardware: Continuous pulls, as selected by Architect. One per door leaf.
 - e. Accessories: Provide guide rails, rollers, door stops, floor guides, door steady, connectors, fasteners and all required accessories for complete assembly.
- I. Adhesive for Bonding Plastic Laminate: Contact cement.
- 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
- J. 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.
- 2.2 CABINET HARDWARE AND ACCESSORIES
- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware."
 - B. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 - 2. Other specific finishes are scheduled on Drawings
 - C. Bumpers: Clear pressure sensitive non-skid vinyl bumpers 1/2 inch diameter by 5/32 inches thick; Grass #GF-BP-C, or equivalent.
 - D. Frameless Concealed Hinges (European Type): 180 degrees of opening, self-closing, three-way adjustable; Grass #GF-1200VX-8, or equivalent.
 - E. Catches: Magnetic catches, 5 lb. holding power; Ives 324-P69, or equivalent. Provide 1 top mounted at each door.
 - F. Pulls: Hafele 491.41.900 steel finish.
 - G. Wire Management Grommets: Plastic grommets with cut-out covers cap, 1-1/2 inch I.D. unless otherwise indicated; Hughes Plastic Parts, or equivalent. Color as selected by Architect from manufacturer's standard colors.

- H. Drawer Slides: 3/4 extension type, constructed from zinc plated cold-rolled steel, with ball-bearing rollers, 75 lbf (330 N) load rated; Accuride 214 Series, or equivalent.
- I. Slides for File Drawers: Full extension type, constructed from zinc plated cold-rolled steel, with ball-bearing rollers, 200 lbf (890 N) load rated; Accuride 4437 Series, or equivalent.
- J. Pencil Drawer Slides: 45 lbf (200 N), Accuride 214 Series, or equivalent
- K. Adjustable Shelf Supports: Peg type, steel, 5/16" stem length, 1/4" bore, spoon width 25/64"; Progressive IF-739NP, or equivalent.
- L. Locks: Door locks - NL-C8173-26D; drawer locks - NL-C8178-26D; strike - NL-C2004-14A; National Cabinet Lock, or equivalent. Keyed as requested by Owner.
- M. Levelers: Plastic leveling system, including socket, leveler, toe kick clip, and toe kick handle; Camar model CM-835-E1-00, CM-345-10-P2, CM-202-V1-T2, and CM-230-01-DE, or equivalent.
- N. Hooks for Cubbies: Double-pronged stainless steel hooks, ceiling mounted.

2.3 ACCESSORIES

- A. Shelving: 3/4" thick with 3 mm PVC kerfed edges, unless otherwise indicated.
 - 1. Provide MDO plywood for painted shelving.
 - 2. Provide wood veneered panel product with solid wood edge where scheduled or indicated on drawings.
 - 3. Provide plastic laminate faced panel product where scheduled or indicated on drawings.
 - 4. Shelving as part of a bookcase assembly shall be 1" thick.
- B. Adjustable Shelf Supports: Decorative, heavy-duty double-slotted standards adjustable on 1-1/4" centers with decorative brackets in length indicated on drawings. Include all accessories including cover strips, end caps, joiners, spacers and fasteners, as required for complete installation. Provide with epoxy finish in color as selected by Architect from manufacturer's standards.
 - 1. Product: Knap & Vogt #82 standards and #182 brackets, or equivalent.
- C. Countertop Support: Rakks EH Surface Mount Bracket RAKKS #EH1824 or equal.
 - 1. Finish: White or grey powder paint finish as selected by Architect.

2.4 INSTALLATION MATERIALS

- A. 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.

2.5 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide 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. 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 (1.5 mm)
- D. Complete fabrication, including assembly, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.

2.6 INTERIOR WOOD TRIM AND RAILS

- A. Quality Standard: Comply with AWI Section 6.
- B. Grade: Premium, for transparent finish items.
- C. For trim items wider than available lumber, use veneered construction. Do not glue for width.
- D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work
- E. Assemble casings in plant except where limitations of access to place of installation require field assembly.

- F. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.7 WOOD CABINETS AND CASEWORK FOR TRANSPARENT FINISH

- A. Quality Standard: Comply with AWI Section 10 requirements for custom wood cabinets.
- B. Grade:
 - 1. Premium, for transparent finish items.
- C. AWI Type of Cabinet Construction: Flush overlay.
- D. Wood Species and Cut for Exposed Surfaces: As specified above.
- E. Grain and Veneer Matching: As specified above
- F. Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. All cabinet interiors (at cabinets with doors) shall be plastic laminate faced with edgebanding as specified above
 - 2. Drawer Sides and Backs: Thermoset decorative overlay.
 - 3. Drawer Bottoms: Thermoset decorative overlay.
- G. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops

2.8 PLASTIC-LAMINATE CABINETS AND CASEWORK

- A. Quality Standard: Comply with AWI Section 10 requirements for custom laminate cabinets.
- B. Grade: Premium
- C. AWI Type of Cabinet Construction: Full overlay.
- D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: HGS.
 - 2. Postformed Surfaces: HGP.
 - 3. Vertical Surfaces: HGS.
 - 4. Edges: HGS
- E. Materials for Semiexposed Surfaces Other Than Drawer Bodies:
 - 1. Drawer Sides and Backs: Thermoset decorative overlay.

2. Drawer Bottoms: Thermoset decorative overlay.

- F. Colors, Patterns, and Finishes: As scheduled, or if not scheduled, as selected by Architect.
- G. Substrate: Plywood.
- H. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.9 PLASTIC LAMINATE COUNTERTOPS

- A. Quality Standard: Comply with AWI Section 11 requirements for high-pressure decorative laminate countertops.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate Grade: HGS.
- D. Colors, Patterns, and Finishes: As scheduled, or if not scheduled, as selected by Architect.
- E. Edge Treatment: As indicated on Drawings.
- F. Core Material: Particleboard or medium-density fiberboard.
- G. Core Material at Sinks: Particleboard made with exterior glue, or medium-density fiberboard made with exterior glue
- H. Backing: Provide all laminate counter tops with backer/balance sheets.
- I. Provide backsplashes and end splashed as indicated.

2.10 SHOP FINISHING

- A. Quality Standard: Comply with AWI Section 5, unless otherwise indicated.
 - 1. Grade: Provide finishes of same grades as items to be finished.
- B. General:
 - 1. Finish all transparent finished architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative overlay.
- D. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523:
1. AWI Finish System 9: UV Curable, Acrylated Epoxy, Polyester or Urethane.
 2. Staining: As selected by Architect.
 3. Wash Coat for Stained Finish: Apply a vinyl wash coat to woodwork made from closed-grain wood before staining and finishing.
 4. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Sections cited for fabrication and in the same grade, as specified in Part 2 of this Section for type of woodwork involved
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- E. Wood Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less

than 36 inches (900 mm) long, except where shorter single-length pieces are necessary.

1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished.
 2. Install trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 2. Maintain veneer sequence matching of cabinets with transparent finish.
 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c.
 3. Caulk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- H. Sliding Whiteboard Doors: Install sliding whiteboard door system and associated components according to manufacturer's written instructions.
1. Set units level and plumb.
 2. Maintain uniform clearances between adjacent components.
 3. Lubricate hardware and other moving parts according to manufacturer's written instructions.
 4. Adjust doors and hardware to produce smooth operation and tight fit at contact points.
- I. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop.

3.3 ADJUSTING AND CLEANING

22 March 2024
Issued for Bid

Katonah-Lewisboro Union Free School District
Additions and Alterations to Meadow Pond Elementary School
SED No. 66-01-01-03-0-007-016

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064020

SECTION 066116 - SOLID SURFACE MATERIAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes solid surface material fabricated into the following:
 - 1. Solid surface material countertops.
 - 2. Solid surface material window sills
- B. Related Sections include the following:
 - 1. Blocking and grounds, including supports for solid surface material countertops, is specified in Division 06 Section "Miscellaneous Carpentry".
 - 2. Sealants are specified in Division 07 Section "Sealants."

1.2 ACTION SUBMITTALS

- A. Shop Drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions, cutouts for insertion of accessories, and coordination requirements with adjacent work.
- B. Samples: Submit minimum 6" x 6" samples of selected colors and patterns. Where color is not specified, provide full range of manufacturer's available color samples for selection by Architect.
- C. Product Data: Indicate product description, fabrication information, and compliance with specified performance requirements.

1.3 INFORMATIONAL SUBMITTALS

- A. Maintenance Data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project closeout documents.
- B. Fabricator's Certificate: Submit certificate from manufacturer stating that fabricator is certified by manufacturer for this work.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm experienced and licensed by manufacturer for production of solid surface fabrications similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.

- B. Fire-Test-Response Characteristics: Provide materials with surface-burning characteristics as indicated below, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less

1.5 JOB CONDITIONS

- A. Do not deliver components to project site until areas are ready for installation. Store indoors.
- B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.
- C. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of work. Allow for adjustments where taking of field measurements before fabrication might delay work.
- D. Coordination: Furnish inserts and anchorages which must be built into other work. Coordinate delivery with other work to avoid delay.

1.6 WARRANTY

- A. General: The special warranty 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. Manufacturer's Warranty. The manufacturer warrants to the original purchaser for commercial use that the manufacturer will at its option repair or replace, without charge, such product if it fails due to a manufacturing defect during the first 10 years after initial installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturers: Provide Basis of Design Products or equal product of one of the following:
 - 1. AristechAcrylics, LLC.
 - 2. DuPont Polymers
 - 3. Formica

2.2 MATERIALS

- A. General: Provide materials which have been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are not acceptable.
- B. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ICPA SS-1.
 - 1. Thickness: 12 mm (1/2").
 - 2. Color(s) and Pattern(s):
 - a. Countertops and Splashes: One of the following in locations indicated:
 - 1) Library: Corian "Silver Birch"
 - 2) STREAM Lab: Corian "Ash Concrete"
 - 3) Kindergarten: Corian "Laguna Terrazzo."
 - 4) Transaction Window Counter: Corian "Silver Birch"
 - b. Window Sills (at new windows only): Corian "Dove."
 - 3. Finish: Semigloss.
 - 4. Basis of Design Products: Corian Solid Surface by DuPont Polymers, or equal.

2.3 MISCELLANEOUS MATERIALS

- A. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints with chemical bonding.
- B. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.4 FABRICATION

- A. General: All fabrications shall be made using solid surface material. Fabrications shall be adhesively jointed with no exposed seams and having edge details as indicated on drawings. No exposed fasteners shall be allowed.
- B. Factory fabricate components into single unit to sizes and shapes indicated, in accordance with approved shop drawings.
- C. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
- D. Provide factory cutouts for bowls, plumbing fittings and accessories as indicated on the drawings.
- E. Cut and finish component edges with clean, sharp returns. Route radii and contours to template. Repair or reject defective and inaccurate work.

- F. Countertops: Fabricate tops in one piece. Comply with solid surfacing material manufacturer's recommendations for adhesives, sealers, fabrication, and finishing. Provide countertops with backsplash, endsplashes, aprons and nosings as shown.
 - 1. Total countertop thickness shall be as indicated on the Drawings or if not indicated, 1-1/2" thick. Provide built-up fabrication as required to obtain required total thickness.
 - 2. Countertop Edges: Built-up, 1-1/2" thick, with eased edge.

- G. Allowable Tolerances
 - 1. Variation in component size: $\pm 1/8$ ".
 - 2. Location of openings: $\pm 1/8$ " from indicated location.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine surface to receive work and conditions under which work will be installed. Do not proceed with work until all unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install components plumb and level, scribed to adjacent finishes, in accordance with approved shop drawings and product installation data.
- B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Keep components and hands clean when making joints.

3.3 ADJUST AND CLEAN

- A. Clean exposed surfaces using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period. Repair work or replace damaged work that cannot be repaired as required.
- B. Keep components and hands clean during installation. Remove adhesives, sealants, and other stains. Replace stained components.

END OF SECTION 066116

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Foam-plastic board insulation.
2. Mineral-wool board insulation
3. Mineral-wool blanket insulation.

B. Related Sections:

1. Section 042000 "Unit Masonry" for insulation installed in cavity walls and masonry cells.
2. Section 078446 "Joint Firestopping" for insulation installed as part of a perimeter joint firestopping system.
3. Section 092900 "Gypsum Board" for installation of acoustical blankets in metal-framed assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.4 QUALITY ASSURANCE

- A. 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.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
1. Basis of Design Product: Styrofoam Brand SM Insulation by DuPont (formerly Dow) or equal products by one of the following:
 - a. DiversiFoam Products.
 - b. Owens Corning.
 2. Type IV, 25 psi (173 kPa).
 3. Thickness: As indicated on Drawings for each application.
 4. Edges: Square edge or shiplap edge boards, manufacturer's standard for thicknesses required.
 5. Applications: Below grade applications.
- B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
1. VOC Limits: Provide adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).

2.2 MINERAL-WOOL BOARD INSULATION (SEMI-RIGID)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:
1. Industrial Insulation Group LLC; Div. of Johns Manville
 2. Isolatek International.
 3. Owens Corning.
 4. Roxul Inc.
 5. Thermafiber
- B. Foil-Faced, Mineral-Wool Board Insulation: ASTM C 612; faced on one side with foil-scrim or foil-scrim-polyethylene vapor retarder; with maximum flame-spread and smoke-developed indexes of 25 and 5, respectively, per ASTM E 84.
1. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

2. Fiber Color: Regular color, unless otherwise indicated.
3. Thickness: As indicated on Drawings for each application
4. Application: Provide for perimeter wall insulation at fin tube cabinet enclosures' interior surfaces.

2.3 MINERAL-WOOL BLANKET INSULATION

- A. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type 1 (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ROXUL; Comfortbatt
 - b. Thermafiber; UltraBatt
 2. Thickness: As indicated on Drawings for each application
 3. Application: Provide for concealed building insulation in ceiling/roof assemblies, parapets, exterior stud walls, and elsewhere indicated on drawings.

2.4 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
1. Products: Subject to compliance with requirements, provide one of the following or equal:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Eckel Industries of Canada; Stic-Klip Type N Fasteners
 - c. Gemco; Spindle Type.
 2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
 3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.
- B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
1. Products: Subject to compliance with requirements, provide one of the following or equal:
 - a. Gemco; 90-Degree Insulation Hangers.
 2. Angle: Formed from 0.030-inch- (0.762-mm-) thick, perforated, galvanized carbon-steel sheet with each leg 2 inches (50 mm) square.
 3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

- C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.
1. Products: Subject to compliance with requirements, provide one of the following or equal:
 - a. AGM Industries, Inc.; RC150 or SC150.
 - b. Gemco; Dome-Cap, R-150 or S-150.
 2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
 - a. Crawl spaces.
 - b. Ceiling plenums.
 - c. Attic spaces.
 - d. Where indicated.
- D. Gas-Actuated Insulation Fasteners: Non-metallic insulation fastener assembly consisting of a plate or washer component formed from HDPE and a nail or pin component fabricated from zinc coated carbon steel pre-mounted in the plastic assembly, designed to be installed using a proprietary gas-actuated tool.
1. Products: Subject to compliance with requirements, provide one of the following or equal:
 - a. X-IE-G Insulation Fastening System by Hilti
 - b. Ramset-I-F System by ITW Commercial Construction

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce

thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions. Extend insulation to dimension below exterior grade line as indicated.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.4 INSTALLATION OF INSULATION FOR FRAMED AND FURRED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs. Install with required number of fasteners in accordance with manufacturer's recommendations.
- C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Unfaced mineral wool insulation.

3.5 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR AND MOISTURE BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fluid-applied, vapor-permeable membrane air and moisture barriers.
- B. Related Requirements:
 - 1. Section 061643 "Gypsum Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.2 DEFINITIONS

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review air-barrier requirements and installation, special details, mockups, air-barrier protection, and work scheduling that covers air barriers.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier assemblies.
 - 1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 2. Include details of interfaces with other materials that form part of air barrier.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.
- C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to set quality standards for materials and execution and for preconstruction testing.
 - 1. Install fluid-applied membrane air barriers system on mockups of exterior wall systems specified in other specification sections to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
 - a. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
 - b. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.9 WARRANTY

- A. Manufacturer's Warranty: Submit manufacturer's standard warranty form for membrane systems, include affirmation of waterproofing mock-up observation and approval as required by warranty provisions. Approval by manufacturer for warranty is required prior to system application. Submit manufacturer's "Request Form" and supporting

documentation at completion of waterproofing application through the local Authorized Distributor of the materials.

1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Installer's Warranty: Installer's standard form in which installer agrees to repair or replace membranes that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.
- B. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- A. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa) when tested according to ASTM E 283, ASTM E 783, or ASTM E 2357.

2.3 HIGH-BUILD VAPOR-PERMEABLE MEMBRANE AIR BARRIER

- A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Synthetic polymer membrane with an installed dry film thickness, according to manufacturer's written instructions, of 35 mils (0.9 mm) or thicker over smooth, void-free substrates.
 1. Basis of Design Product: Provide Henry Company; Air-Bloc 31MR or one of the following:
 - a. GCP Applied Technologies: Perm-A-Barrier VPL.
 - b. ExoAir 230 by Tremco.
 2. Physical and Performance Properties:

- a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E 2178.
- b. Vapor Permeance: Minimum 10 perms (580 ng/Pa x s x sq. m); ASTM E 96/E 96M.
- c. Ultimate Elongation: Minimum 200 percent; ASTM D 412, Die C.

2.4 ACCESSORY MATERIALS

- A. General: Provide primers, transition strips, termination strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.
 1. Basis of Design Product: Aquatac by Henry Co., or equal.
- C. Liquid Flashing: Moisture cure single-component elastomeric liquid-applied flashing containing Silyl-Terminated Polyether (STPE) polymer, designed to cure through reaction with airborne moisture.
 1. Basis of Design Product: Air-Bloc LF Liquid-Applied Flashing by Henry Co., or equal.
- D. Counterflashing Strip: Modified bituminous, 40-mil- (1.0-mm-) thick, self-adhering sheet consisting of 32 mils (0.8 mm) of rubberized asphalt laminated to an 8-mil- (0.2-mm-) thick, cross-laminated polyethylene film with release liner backing.
 1. Basis of Design Product: Blueskin SA or Blueskin SA LT by Henry Co., or equal

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 2. Verify that concrete has cured and aged for minimum time period recommended by air-barrier manufacturer.
 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 4. Verify that masonry joints are flush and completely filled with mortar.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with 26 gauge stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- H. Bridge isolation joints, expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 ACCESSORIES INSTALLATION

- A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.
 - 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 - 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers,

exterior door framing, and other construction used in exterior wall openings, using accessory materials.

- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip/flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames, with not less than 1 inch (25 mm) of full contact.
 - 1. Transition Strip/Flashing: Roll firmly to enhance adhesion.
- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with sealant.
- G. Terminations:
 - 1. Seal strips and transition strips around masonry reinforcing or ties and penetrations.
 - 2. Seal top of through-wall flashings to air barrier with an additional 6-inch- (150-mm-) wide, transition strip.
 - 3. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with sealant or liquid flashing.
- H. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.4 FLUID AIR-BARRIER MEMBRANE INSTALLATION

- A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
 - 1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 - 2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
 - 3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats

- B. High-Build Membrane Air Barriers: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.
 - 1. Vapor-Permeable Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 35-mil (0.9-mm) dry film thickness, applied in one or more equal coats.
- C. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.
- D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a Project Inspector to perform inspections.
- B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Continuous structural support of air-barrier system has been provided.
 - 3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
 - 4. Site conditions for application temperature and dryness of substrates have been maintained.
 - 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 - 6. Surfaces have been primed, if applicable.
 - 7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 - 8. Termination mastic has been applied on cut edges.
 - 9. Strips and transition strips have been firmly adhered to substrate.
 - 10. Compatible materials have been used.
 - 11. Transitions at changes in direction and structural support at gaps have been provided.
 - 12. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 - 13. All penetrations have been sealed.
- C. Air barriers will be considered defective if they do not pass tests and inspections.
 - 1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.

- D. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.6 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
 - 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 074114 - METAL-FACED GLAZING PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Insulated metal-faced wall panels for glazing into exterior storefront and entrance framing.

1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, and special details. Distinguish between factory- and field-assembled work.
- C. Samples for Initial Selection: For each type of metal-faced panel indicated with factory-applied color finishes.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on metal panels from exposure to sunlight and high humidity, except to extent necessary for period of metal panel installation.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify locations of framing dimensions by field measurements before metal panel fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

- A. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alclad alloy 3003, 3004, or 3105 for painted finishes, with temper as required to suit forming operations and structural performance required.

2.2 METAL-FACED INSULATED WALL PANELS

- A. Insulated Metal Panels: Manufacturer's standard laminated aluminum-faced panels of overall thickness indicated, flat with no deviations in plane exceeding 1/16 inch in 24 inches (1.5 mm in 600 mm) or 1/8 inch (3 mm) over entire panel, forming outer skin of insulated panels with core of rigid insulation between panels.
 - 1. Face Panels Fabrication: Face panels shall be coil coated aluminum sheet bonded to solid substrate.
 - a. Aluminum Sheet Thickness: 0.032"
 - b. Substrate: 1/8" tempered hardboard.
 - c. Exposed Panel Texture: Smooth.
 - d. Exposed Panel Finish: Painted enamel or powder paint, in color as selected by Architect from full range of colors.
 - 2. Core: Rigid, polyisocyanurate 1.7 lb. density
 - 3. Edge Configuration: Unsealed.
 - 4. Overall Panel Thickness: 1".
 - 5. Basis of Design Product: Mapes-R Panel by Mapes Architectural Products or equal.

2.3 FABRICATION

- A. General: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

2.4 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PANEL INSTALLATION, GENERAL

- A. General: Install metal-faced panels in orientation, sizes, and locations indicated on Drawings and in compliance with approved shop-drawings. Anchor metal-faced panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Field cutting of metal-faced glazing panels is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal-faced panel manufacturer.

3.3 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074114

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in fire-resistance-rate horizontal assemblies.
3. Penetrations in non-fire-resistance-rate horizontal assemblies.
4. Penetrations in smoke barriers, smoke partitions and smoke tight partitions.

B. Related Sections:

1. Section 078446 "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include

having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration firestopping correspond to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek ETL SEMKO in its "Directory of Listed Building Products."
 - 3) FM Global in its "Building Materials Approval Guide."

C. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
- C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

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. Penetration Firestop Systems specified in the Schedule in Part - 3 include:
 - a. Fire Barrier Products, 3M Fire Protection Products
 - b. RectorSeal Corporation.
 2. Subject to compliance with specified requirements, provide Penetration Firestop Systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory (BXRH), by one of the following:
 - a. Hilti, Inc.
 - b. Nelson Firestop Products.
 - c. RectorSeal Corporation.
 - d. Specified Technologies Inc.
 - e. 3M Fire Protection Products.
 - f. Wiremold/Legrand

2.2 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. Horizontal assemblies include floors and floor/ceiling assemblies.
 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30-inch wg (74.7 Pa) at both ambient and elevated temperatures.

- E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- G. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- H. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.

3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
- C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. For penetrations in non-fire rated horizontal assemblies, smoke barriers, smoke partitions and smoke tight partitions, provide systems tested for 1 hour unless otherwise noted.
- C. Basis of Design Assemblies: Subject to compliance with requirements, provide the design indicated below or a comparable UL design by one of manufacturer's listed in Part 2 above.
 1. Schedule of construction components, type of penetrant, and U.L. Penetration Firestop Systems include, but are not limited to the following:
 2. Schedule of construction components, type of penetrant, and U.L. Penetration Firestop Systems include, but are not limited to the following:

	P E N E T R A N T
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	Metal Conduit	Cable Tray⁴	Cables	Non-Insul. Metal Pipe	Insul. Pipe	FR Polypropylene Pipe	Insul. Metal Duct
GWB Stud Wall, or Shaft Wall up to 2 Hr Rating	W-L-1001	W-L-4004	W-L-3001	W-L-1001	W-L-5011	W-L-2002	W-L-7006 ³
CMU Wall up to 2 Hr Rating	C-AJ-1044	C-AJ-4003	C-AJ-3030	C-AJ-1044	C-AJ-5001	C-AJ-2001	C-AJ-7003 ³ , 7016 ³
Concrete Floor / Metal Deck 1 Hr Rated F and T-Rating²	C-AJ-1008	N/A	C-AJ-3029	C-AJ-1008	C-AJ-5002	F-A-2002	C-AJ-7009 ⁵
Concrete Floor / Metal Deck 2 Hr Rated F and T-Rating²	C-AJ-1008	N/A	C-AJ-3029	C-AJ-1008	C-AJ-5060	F-A-2002	N/A
Concrete Floor / Metal Deck up to 2 Hr F Rated¹	F-A-1002	N/A	C-AJ-3030	C-AJ-1044	C-AJ-5001	F-A-2002	N/A

KEY TO NOTES

1. Penetration within wall cavity.
2. Penetration that does not fall within wall cavity, T-Rating required.
3. Up to 1 hour rating, submit engineered judgement firestopping system for this combination of penetrant, wall/floor assembly, and fire rating. Install fire dampers in 2-hour walls in accordance with manufacturer's instructions and testing agency requirements.
4. Where cable tray extends through wall.
5. For floor penetrations not enclosed above and below the floor with shaft wall.

D. Membrane Penetrations:

1. Firestop membrane penetrations by cables, pipes and conduit similar to through wall penetrations.
 2. Provide putty pad box wrap firestopping for membrane penetrations in rated walls for electrical back boxes over 16 sq. inches, where any back boxes are located within 24 inches horizontal of another back box, or when total area of back boxes exceeds 100 sq in. in 100 sq. ft. of wall area.
- E. Where another type of construction or penetrant is encountered, or if field conditions vary from those described in the U.L. System listed (i.e. annular space is greater/smaller, insulation type varies, etc.), provide firestopping systems which are appropriate, and U.L. tested, for that condition.

END OF SECTION 078413

SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints in smoke barriers.

B. Related Sections:

1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint

system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

- B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:
 - 1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:
 - a. Fire-resistive joint system products bear classification marking of qualified testing agency.
 - b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
- C. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.
- C. Notify Owner's testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

- A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall

accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

- B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:
1. Joints include those installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
 3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Grace Construction Products.
 - b. Hilti, Inc.
 - c. RectorSeal Corporation.
 - d. Specified Technologies Inc.
 - e. 3M Fire Protection Products.
 - f. Tremco, Inc.; Tremco Fire Protection Systems Group.
- C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.
1. L-Rating: Not exceeding 5.0 cfm/ft (0.00775 cu. m/s x m) of joint at 0.30 inch wg (74.7 Pa) at both ambient and elevated temperatures.
 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Grace Construction Products.
 - b. Hilti, Inc.
 - c. Johns Manville.
 - d. RectorSeal Corporation.
 - e. Specified Technologies Inc.
 - f. 3M Fire Protection Products.
 - g. Tremco, Inc.; Tremco Fire Protection Systems Group.
- D. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings

required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 2. Apply fill materials so they contact and adhere to substrates formed by joints.
 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.
- C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.7 FIRE-RESISTIVE JOINT SYSTEM / FIRESTOP JOINT SYSTEM SCHEDULE

A. Where UL-classified firestop joint systems are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHBN.

Firestop Joint System Location	Basis-of-Design	Assembly Rating	Nominal Joint Width	Movement Capabilities ²
Floor-to-Wall				
Rated concrete masonry wall construction intersection with adjacent floor construction	FW-D-1012, FW-D-1013	1 hour or 2 hours ¹	As indicated, or required by tested assembly	Class II
Head-of-Wall				
Rated gypsum wall construction intersection with steel floor deck above	HW-D-0087, or HW-D-0089	1 hour or 2 hours ¹	As indicated, or required by tested assembly	Class II or III,
Rated gypsum wall construction intersection with concrete floor deck above	HW-D-0083, HW-D-209	1 hour or 2 hours ¹	As indicated, or required by tested assembly	Class II
Rated concrete masonry wall construction intersection with steel floor deck above	HW-D-0081, or HW-D-0098	1 hour or 2 hours ¹	As indicated, or required by tested assembly	Class II
Rated concrete masonry wall construction intersection with concrete floor deck above	HW-D-0268, HW-D-0097	1 hour or 2 hours ¹	As indicated, or required by tested assembly	Class II
Bottom-of-Wall				
Rated gypsum wall construction intersection with concrete floor	BW-S-0002	1 hour or 2 hours ¹	As indicated, or required by tested assembly	Static

1. Rating to match wall construction.
2. Class UL2079

B. Where another type of construction is encountered, or if field conditions vary from those described in the U.L. System listed (i.e. annular space is greater/smaller,

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insulation type varies, etc.), provide firestopping systems which are appropriate, and U.L. tested, for that condition.

END OF SECTION 078446

ATTACHMENT: FIRESTOP JOINT SYSTEMS SUBMITTAL SHEET

3.8 FIRESTOP JOINT SYSTEMS SUBMITTAL SHEET

A. **HEAD-OF-WALL FIRESTOPPING:** Fill in the U.L. Design number and attach copy of U.L. Test. Insert n/a if condition is not applicable.

1. Gypsum wall construction intersection with floor deck above: _____.
Gypsum wall construction intersection with roof deck above: _____.
2. Concrete masonry wall construction intersection with floor deck above: _____.
3. Concrete masonry wall construction intersection with roof deck above: _____.

B. **FLOOR-TO-WALL FIRESTOPPING:** Fill in the U.L. Design number and attach copy of U.L. Test. Insert n/a if condition is not applicable.

1. Concrete masonry wall construction intersection with adjacent floor construction: _____.

C. **BOTTOM-OF-WALL FIRESTOPPING:** Fill in the U.L. Design number and attach copy of U.L. Test. Insert n/a if condition is not applicable.

1. Gypsum wall construction intersection with floor deck: _____. Gypsum wall construction intersection with roof deck above: _____.
2. Concrete masonry wall construction intersection with floor _____.
3. Concrete masonry wall construction intersection with roof deck above: _____.

D. **CURTAIN WALL FIRESTOPPING:** Fill in the design number and copy test. Insert n/a if condition is not applicable.

1. Aluminum mullion and glass spandrel panel curtainwall intersection with adjacent floor construction:
2. Gypsum sheathed curtainwall intersection with adjacent floor construction: _____.

E. **OTHER:** Where another type of construction or penetrant is encountered, attach a separate sheet listing each condition and attach copy of the U.L. Test.

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes joint sealants for the following locations:
1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
 - a. Control and expansion joints in cast-in-place concrete
 - b. Joints in brick veneer wall surfaces.
 - c. Joints at cast stone units.
 - d. Joints between different materials listed above
 - e. Perimeter joints between materials listed above and frames of aluminum entrance and storefront framing, and frames of doors, louvers and windows.
 - f. Control and expansion joints in ceiling and overhead surfaces.
 - g. Other joints as indicated.
 2. Exterior joints in the following horizontal traffic surfaces:
 - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and storefront and entrance framing.
 - e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - f. Tile control and expansion joints
 - g. Openings and joints in sound-rated partitions.
 - h. Other joints as indicated.
 4. Interior joints in the following horizontal traffic surfaces:
 - a. Control and expansion joints in tile flooring.
 - b. Control and expansion joints in cast-in-place concrete slabs.
 - c. Other joints as indicated.
- B. Related Sections include the following:
1. Sealants used in glazing are specified in Division 08 "Glazing."

1.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.
- C. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch (13-mm) wide joints formed between two 6-inch (150-mm) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.4 INFORMATIONAL SUBMITTALS

- A. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.
- B. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project names addresses, names of Architects and Owners, plus other information specified.
- C. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- D. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.
- E. Preconstruction field test reports indicating which products and joint preparation methods demonstrate acceptable adhesion to joint substrates.
- F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an installer who has successfully completed at least three (3) joint sealer applications similar in type and size to that of this project within the last five (5) years. All workers used for work of this Section shall be experienced in the techniques

of sealant application and shall be completely familiar with the published recommendations of the manufacturer of the joint sealant materials being used.

- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:
1. Locate test joints where indicated or, if not indicated, as directed by Architect.
 2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 - b. Each type of non-elastomeric sealant and joint substrate indicated.
 3. Notify Architect one week in advance of the dates and times when mock-ups will be erected.
 4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
 5. Test Method: Test joint sealants by hand pull method described below:
 - a. Install joint sealants in 60 inches (1500 mm) joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealants to cure fully before testing.
 - b. Make knife cuts horizontally from one side of joint to the other followed by 2 vertical cuts approximately 2 inches (50 mm) long at side of joint and meeting horizontal cut at top of 2-inch (50-mm) cuts. Place a mark 1 inch (25 mm) from top of 2-inch (50-mm) piece.
 - c. Use fingers to grasp 2-inch (50-mm) piece of sealant just above 1-inch (25-mm) mark; pull firmly down at a 90-degree angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 6. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
 7. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.
- D. Field-Constructed Mock-Ups: Prior to installation of joint sealants, apply elastomeric sealants as follows to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution:
1. Joints in field-constructed mock-ups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants specified in this Section.

- E. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of the Division 01 Section covering this activity.
- F. Random Field Tests: Periodically test sealants, in place, for adhesion, using methods recommended by sealant manufacturer. Promptly replace any sealant that does not adhere, fails to cure, or fails to perform as specified by the sealant manufacturer.
- G. Field Water Test: Perform two field water tests on completed areas including as many conditions as possible. If leakage occurs during testing, repair as required, and re-test area and also test two additional locations.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F (4 deg C).
 - 2. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.8 COORDINATION

- A. Coordinate the work with all sections referencing this section.

1.9 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

- B. Manufacturer's Warranty: Provide written warranty agreeing to repair or replace, at no cost to Owner, defective materials for twenty (20) years, and workmanship for two (2) years from the Date of Substantial Completion. Defective materials and workmanship shall include, but are not limited to:
1. Deterioration, aging or weathering of the work;
 2. Water leakage and/or air leakage;
 3. Sealant loss of adhesion, loss of cohesion, cracking or discoloration;
 4. Staining or discoloration of adjacent surfaces;
 5. Joint failure due to building or joint movement up to the limits prescribed by the manufacturer;
 6. Cracks or bubbles on sealant surface.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:
1. Provide selections made by Architect from manufacturer's standards or custom colors to match Architect's samples, as directed by Architect.
- C. Additional Movement Capability: Where additional movement capability is specified, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for Uses indicated.
- D. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- E. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project

2.2 LATEX JOINT SEALANT

- A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part, nonsag, mildew-resistant, paintable latex acrylic-emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of not more than plus or minus 5 percent.

- 1. Available Products: Subject to compliance with requirements, latex joint sealants that may be incorporated in the Work include, but are not limited to, the following:
 - a. AC-20; Pecora Corporation.
 - b. Tremflex 834; Tremco.
 - c. ALEX PLUS; DAP .

- B. Uses: General interior use, paintable.

2.3 MILDEW-RESISTANT SILICONE JOINT SEALANT

- A. Single-Component Mildew-Resistant Silicone Sealant: Manufacturer's standard, non-modified, one-part, silicone sealant; complying with ASTM C 920, Type S, Grade NS, Class 25, Uses NT, G, A, and, as applicable to non-porous joint substrates indicated, O. Formulate sealant with fungicide and specifically intended for sealing interior joints with nonporous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.

- 1. Available Products: Subject to compliance with requirements, silicone joint sealants that may be incorporated in the Work include, but are not limited to, the following:
 - a. 786 Mildew Resistant; Dow Corning.
 - b. Sanitary 1700; GE Silicones.
 - c. 898 Silicone Sanitary Sealant; Pecora Corporation.
 - d. Tremsil 600 White; Tremco.

- B. Uses: Interior use in wet locations, and all toilet and shower rooms.

2.4 NONSAG URETHANE JOINT SEALANT

- A. Multicomponent Nonsag Urethane Sealant: Manufacturer's standard, non-modified, multi-part, nonsag urethane sealant; complying with ASTM C 920, Type M, Grade NS, Class 25, Uses NT, M, G, A, and as applicable to joint substrates indicated, O.

- 1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:
 - a. Dynatrol II, Pecora Corporation
 - b. Sikaflex-2c NS, Sika Corporation
 - c. Dymeric 240FC; Tremco.
 - d. Masterseal NP 2; Master Builders Solutions Div., BASF

- B. Uses: Interior use for exposed concrete or masonry wall control joints

2.5 SILICONE JOINT SEALANT

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100, for Use G, A, M, O; non-staining and field-tintable.
 - 1. Basis of Design Product: Provide Pecora Corporation "890FTS" sealant or equal manufactured by one of the following:
 - a. Dow Corning Corporation.
 - b. GE Advanced Materials - Silicones
 - c. Sika Corporation, Construction Products Division
 - d. Tremco Incorporated
- B. Additional Movement Capability: 100 percent movement in extension and 50 percent in compression for a total of 150 percent movement.
- C. Uses: General exterior use.

2.6 POURABLE URETHANE JOINT SEALANT

- A. Multicomponent Pourable Urethane Sealant: Manufacturer's standard, non-modified, two-part, urethane sealant; complying with ASTM C 920, Type M, Grade P, Class 25, Uses T, M, A and, as applicable to joint substrates indicated, O.
 - 1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:
 - a. NR-200 Urexpam, Pecora Corporation
 - b. Sikaflex 2c SL, Sika Corporation
 - c. Masterseal SL 2; Master Builders Solutions Div., BASF
- B. Uses: Interior or exterior use for level pavement or slab joints.

2.7 NONSAG URETHANE JOINT SEALANT

- A. Multi-Part Non-Sag Urethane Sealant: Except as otherwise indicated, provide manufacturer's standard, non-modified, two-part, urethane sealant; complying with ASTM C 920, Type M, Grade NS, Class 25, Uses T, M, A and, as applicable to joint substrates indicated, O.
 - 1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:
 - a. Sikaflex 2c NS; Sika Corp
 - b. Dynatred, Pecora Corporation
 - c. Masterseal NP 2; Master Builders Solutions Div., BASF
- B. Uses: Interior or exterior use for pavement or slab joints where slope exceeds one percent.

2.8 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant: Non-sag (gun grade), non-flammable, latex-based sealant designed to limit sound transmission through interior STC-rated partitions. Sealant remains flexible and adhered to metal, wood, plaster, gypsum, and concrete after drying.
 - 1. Maintains the STC rating of partitions with intersections and penetrations sealed with product: Tested by independent, accredited, NVLAP facility according to ASTM E 90.
 - 2. Products: Provide one of the following:
 - a. QuietZone Acoustic Sealant by Owens Corning.
 - b. OSI GreenSeries SC-175 Draft & Acoustical Sound Sealant by Henkel Corporation
 - c. Pecora AIS-919: Acoustical and Insulation Latex Sealant by Pecora Corporation
 - d. Smoke 'N' Sound Acoustical Sealant by Specified Technologies Inc.
- B. Uses: At penetrations through and intersections of sound-rated wall, floor and ceiling assemblies in order to preserve their ability to reduce airborne sound impact noise transmission.

2.9 PREFORMED FOAM SEALANTS

- A. Preformed Foam Sealants: Manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellent agent; factory-produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:
 - 1. Properties: Permanently elastic, mildew-resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.
 - 2. Impregnating Agent: Chemically stabilized acrylic.
 - 3. Density: Manufacturer's standard.
 - 4. Backing: None.
 - 5. Available Products: Subject to compliance with requirements, preformed foam sealants that may be incorporated in the Work include, but are not limited to, the following:
 - a. "Emseal," Emseal Corp.
 - b. "Emseal Greyflex," Emseal Corp.
 - c. "Wil-Seal 150," Wil-Seal Construction Foams Div., Illbruck.
 - d. "Wil-Seal 250," Wil-Seal Construction Foams Div., Illbruck.

2.10 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
 - 2. Manufacturer: Provide Cera-Rod manufactured by W.R. Meadows, Inc., or equivalent.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.11 JOINT FILLERS FOR EXTERIOR CONCRETE SLABS

- A. General: Provide joint fillers of thickness and depth indicated, or if not indicated 1/2" thick by depth of joint.
- B. Bituminous Fiber Joint Filler: Provide preformed strips of with asphalt binder encased between two layers of saturated felt or glass-fiber felt, complying with ASTM D 1751.
 - 1. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint and seal with sealant.

2.12 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions

affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 3. Remove laitance and form release agents from concrete.
 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
 2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.
- D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
- F. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.
- 3.4 CLEANING
- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.
- 3.5 PROTECTION
- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or

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deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following hollow-metal work:
 - 1. Steel door frames
 - 2. Transom frames, borrowed lite frames and sidelite frames.
 - 3. Fire-rated frames
- B. Related Requirements:
 - 1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.
 - 2. Section 088000 "Glazing" for glazing inserted in hollow metal doors and frames..

1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to SDI A250.8.

1.3 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate preparation of shop drawings for hollow metal doors and frames with door hardware submittals specified in Section 087100. Shop drawings for work of this section will not be reviewed and approved until the hardware submittals in Section 087100 are submitted and approved.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 2. Locations of reinforcement and preparations for hardware.
 - 3. Details of each different wall opening condition.
 - 4. Details of anchorages, joints, field splices, and connections.

5. Details of accessories.
6. Details of moldings, removable stops, and glazing.
7. Details of conduit and preparations for power, signal, and control systems.

- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented 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 vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

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. Ceco Door Products; an Assa Abloy Group company.
 2. Curries Company; an Assa Abloy Group company.
 3. Republic Doors and Frames.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable

to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

- B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Frames: SDI A250.8, Level 3. Provide for interior door and frame locations.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Frames:
 - a. Materials: Minimum thickness of 16 gage, 0.053 inch (1.3 mm), uncoated, steel sheet for the following locations:
 - 1) Wood doors, unless otherwise indicated.
 - b. Materials: Minimum thickness of 14 gage, 0.067 inch (1.7 mm), uncoated, steel sheet (except provide metallic coated where door is metallic coated) for the following locations:
 - 1) Wood doors at all leafs wider than 36-inches (914-mm), and all electrical rooms, storage rooms, machine rooms, mechanical rooms, and maintenance areas
 - c. Construction: Full profile welded.
 - 3. Exposed Finish: Prime door and frames

2.4 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
 - 3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.5 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Sections 088000 "Glazing".
- J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper

assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

- B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches (1524 mm) high.
 - 2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
 - 3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches (1524 mm) high.
 - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
 - 3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
 - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
 6. Head Anchors: Two anchors per head for frames more than 42 inches (1067 mm) wide and mounted in metal-stud partitions.
 7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

- b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Provide loose stops and moldings on inside of hollow-metal work.
 - 5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

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 inch (0.4 mm) thick.

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. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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. Drill and tap doors and frames to receive nontemplated, 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 SDI A250.11 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

- a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
 - C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.
 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.
- 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 Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces for transparent finish.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Division 08 Section "Hollow Metal Doors and Frames" for steel door frames.
2. Division 08 Section "Glazing" for glass view panels in flush wood doors

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications. For acoustical doors, include test report for acoustical performance.

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.
7. Fire-protection ratings for fire-rated doors.
8. Provide schedule of doors based on door schedule included in contract documents

- C. Samples for Initial Selection: For factory-finished doors.

- D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

3. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
 - a. Provide Samples for each species of veneer and solid lumber required.
 - b. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For door inspector.
 1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1
 2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4
- B. Sample Warranty: For special warranty.
- C. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- D. Field quality control reports.

1.5 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies complies with qualifications set forth in NFPA 80, Section 5.2.3.1
- B. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies complies with qualifications set forth in NFPA 101, Section 7.2.1.15.4

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during remainder of construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:

- a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.
2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 3. Warranty Period for Solid-Core Interior Doors: Life of installation.
- B. Contractor's Responsibilities: Replace doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty

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. Marshfield – Algoma by Masonite Architectural
 2. Oshkosh Door Company.
 3. VT Industries, Inc. (formerly Eggers)
- B. Source Limitations:
1. Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
 2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
- B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C. After 5 minutes into the NFPA 252 test, the neutral pressure level in the furnace shall be established at 40 inches (1016 mm) or less above the sill. Provide "Category A" Positive Pressure Tested doors for all fire-rated wood doors.
1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

2. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 3. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile; UL category A. Comply with specified requirements for exposed edges.
 4. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
- D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- E. Particleboard-Core Doors:
1. Particleboard: ANSI A208.1, Grade LD-2, made with binder containing no urea-formaldehyde.
 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
 - b. 5-inch (125-mm) bottom-rail blocking, in doors and doors indicated to have kick, mop, or armor plates.
 - c. 4-1/2-by-10-inch (114-by-250-mm) lock blocks and 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
- F. Structural-Composite-Lumber-Core Doors:
1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf (3100 N).
 - b. Screw Withdrawal, Edge: 400 lbf (1780 N).
- G. Mineral-Core Doors:
1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware, and as follows:
 - a. 5-inch (125-mm) top-rail blocking.
 - b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
 - d. 4-1/2-by-10-inch (114-by-250-mm) lock blocks and 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - a. Screw-Holding Capability: 550 lbf (2440 N) per WDMA T.M.-10.
- 2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH
- A. Interior Solid-Core Doors:

1. Grade: Custom, with Grade A faces.
2. Species: Birch
3. Cut: Plain sliced.
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Exposed Vertical Edges: Same species as faces - edge Type A
7. Core:
 - a. Non-Rated Doors: Particleboard except provide doors with either glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors with full light or 2 lights
 - b. Fire-Rated Doors: Mineral core.
8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
9. WDMA I.S.1-A Performance Grade: Extra Heavy Duty
10. Basis of Design Doors: Marshfield – Algoma Aspiro Series by Masonite Architectural, or equal.

2.4 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
 1. Wood Species: Same species as door faces.
 2. Profile: Manufacturer's standard shape.
 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
- C. Where Pyrostop glazing is scheduled to be inserted into openings in wood doors provide door manufacturer's special window kit to accommodate thickness of glazing unit.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Align and fit doors in frames with uniform clearances and bevels as indicated below. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 5/8 inch (16 mm) from bottom of door to top of threshold unless otherwise indicated.

- a. Comply with NFPA 80 for fire-rated doors.
 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
- D. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining. Openings: Factory cut and trim openings through doors.
1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."

2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
1. Grade: Premium.
 2. Finish: WDMA TR-6 and AWS system 11 catalyzed polyurethane.
 3. Staining: Match existing.
 4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
 5. Sheen: Satin

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."

- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated doors according to NFPA 80.
 - 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and commissioning activities and to furnish reports to Architect.
- B. Inspections:
 - 1. Fire-Rated Door Inspections: Inspect each fire-rated door according to NFPA 80, Section 5.2.
 - 2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- C. Commissioning: Commissioning of all doors shall be performed by the installer supervised by an Architectural Hardware Consultant who is thoroughly knowledgeable of the various components and systems. Include the following:
 - 1. Testing of opening force, closing device, complete closure of the door within clearance tolerances, and full engagement of latch(es) where required by door type.
 - 2. Verify cleanliness of labels, fusible links and other components that cannot be painted.
 - 3. Functional testing of automatic-closing or power-operated fire door assemblies and electrically controlled latching hardware or release devices shall be coordinated with all components of the electrically controlled system.
 - 4. After all doors have been commissioned and prior their acceptance, the Architect, in consultation with the Owner, will select doors (at least one for each operational type) whose full range operation shall be demonstrated by the Contractor to the satisfaction of the Architect.
- D. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- E. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- F. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80.
- G. Prepare and submit separate inspection report for each egress door assembly indicating compliance with each item listed in NFPA 101.

H. Prepare and submit commissioning report of all doors.

3.4 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall access doors and frames for interior locations.
2. Fire-rated wall access doors and frames for interior locations
3. Ceiling access doors and frames for interior locations.
4. Fire-rated ceiling access doors and frames for interior locations.

B. Locations and Quantities of Access Doors: Not all access doors are shown on the Drawings. It is the intent of this section that access doors be provided wherever access is required for operation and maintenance of concealed equipment, dampers, valves, controls or similar devices.

C. Cylinders for access doors are specified in Division 08 Section "Door Hardware."

D. Related Requirements:

1. Division 07 Section "Roof Accessories" for roof hatches.
2. Division 23 Section "Air Duct Accessories" for heating and air-conditioning duct access doors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Detail fabrication and installation of access doors and frames for each type of substrate.

C. Samples: For each door face material, at least 3 by 5 inches (75 by 125 mm) in size, in specified finish.

D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

1.3 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule specified in "Submittals" Article

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 PRODUCTS, GENERAL

- A. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

2.3 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- 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. Babcock-Davis.
2. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
3. Karp Associates, Inc.
4. Larsen's Manufacturing Company.
5. Milcor Inc.
6. Nystrom, Inc.

- B. Flush Access Doors, with Exposed Trim, for CMU Surfaces: Units consisting of frame with exposed trim, door, hardware, and complying with the following requirements

1. Basis-of-Design Product: Karp Model DSC-214M, Universal Flush Access Door.
2. Assembly Description: Fabricate door to fit flush to frame. Provide flange integral with frame, 3/4 inch (19 mm) wide, overlapping surrounding finished surface.
3. Locations: Provide at non-rated concrete block walls.
4. Uncoated Steel Sheet for Door: Nominal 0.074 inch (1.9 mm), 14 gage.
 - a. Finish: Factory prime.
5. Stainless-Steel Sheet for Door for Toilet Rooms, Shower Rooms, and Other Wet Areas: Nominal 0.074 inch (1.9 mm), 14 gage; No. 4 finish.
6. Frame Material: Nominal 0.060 inch (1.52 mm), 16 gage
7. Hinges: Concealed continuous piano hinge.
8. Latches: Self-latching key-operated bolt type, with interior release; for locking.

- C. Trimless, Flush Access Doors for Gypsum Board Surfaces: Units consisting of frame, concealed edge trim, door, hardware, and complying with the following requirements:

1. Basis-of-Design Product: Karp KDW for drywall
 2. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
 3. Locations: Provide at non-rated gypsum board walls and ceilings.
 4. Uncoated Steel Sheet for Door: Nominal 0.074 inch (1.9 mm), 14 gage.
 - a. Finish: Factory prime.
 5. Stainless-Steel Sheet for Door for Toilet Rooms, Shower Rooms, and Other Wet Areas: Nominal 0.074 inch (1.9 mm), 14 gage; No. 4 finish.
 6. Frame Material: Nominal 0.060 inch (1.52 mm), 16 gage.
 7. Hinges: Concealed continuous piano hinge.
 8. Latches: Self-latching key-operated bolt type, with interior release; for locking.
- D. Recessed Doors for Acoustical Ceiling Tiles: Units consisting of frame with no exposed trim, recessed door to receive tile, hardware, and complying with the following requirements.
1. Basis-of-Design Product: Karp, Model DSC-210, Recessed Acoustical Ceiling Tile Access Doors.
 2. Locations: Provide at non-rated acoustical ceilings tiles.
 3. Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage thick steel sheet; recessed 1-inch (25.4 mm).
 - a. Finish: Factory prime.
 4. Stainless-Steel Sheet for Door for Toilet Rooms, Shower Rooms, and Other Wet Areas: Nominal 0.060 inch (1.52 mm), 16 gage; No. 4 finish.
 5. Frame Material: Nominal 0.074 inch (1.9 mm), 14 gage.
 6. Hinges: Concealed, pivoting-rod type.
 7. Latches: Self-latching key-operated bolt type, with interior release; for locking.
- E. Insulated, Fire-Rated Access Doors for Drywall Walls and Ceilings: Units consisting of frame with gypsum board bead concealed edge trim, self-latching insulated door, and hardware, and complying with the following requirements:
1. Basis-of-Design Product: Karp, Model KRP-350FR, Insulated Fire Rated Access Door, with Drywall Bead, for Walls and Ceilings.
 2. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release.
 3. Locations: Provide at rated gypsum board walls and ceilings.
 4. Fire-Resistance Ratings:
 - a. Walls: 1-1/2 hours.
 - b. Ceilings: 3 hours.
 5. Uncoated Steel Sheet for Door: 20 ga., 0.0359-inch- (0.91-mm-) thick steel sheet, welded pan type, filled with 2-inch (50 mm) thick fire-rated mineral-fiber insulation.
 - a. Finish: Factory prime.
 6. Stainless-Steel Sheet for Door for Toilet Rooms, Shower Rooms, and Other Wet Areas: Same gage and style as steel door; with No. 4 finish.

7. Frame Material: 16 ga., 0.0598-inch- (1.52-mm-) thick steel sheet, 1-inch (25.4 mm) wide, surrounded by galvanized drywall bead.
 8. Hinges: Concealed continuous piano hinge.
 9. Hardware: Self-latching key-operated bolt type, with interior release; for locking.
- F. Insulated, Fire-Rated Access Doors for CMU Walls: Units consisting of frame with exposed edge trim, self-latching insulated door, and hardware, and complying with the following requirements:
1. Basis-of-Design Product: Karp, Model KRP-150FR, Insulated Fire Rated Access Door, with Exposed Flange, for Walls and Ceilings.
 2. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide flange integral with frame, 1 inch (25 mm) wide, overlapping surrounding finished surface. Provide self-latching door with automatic closer and interior latch release.
 3. Locations: Provide at rated concrete block walls.
 4. Fire-Resistance Ratings:
 - a. Walls: 1-1/2 hours.
 5. Uncoated Steel Sheet for Door: 20 ga., 0.0359-inch- (0.91-mm-) thick steel sheet, welded pan type, filled with 2-inch (50 mm) thick fire-rated mineral-fiber insulation.
 - a. Finish: Factory prime.
 6. Stainless-Steel Sheet for Door for Toilet Rooms, Shower Rooms, and Other Wet Areas: Same gage and style as steel door; with No. 4 finish.
 7. Frame Material: 16 ga., 0.0598-inch- (1.52-mm-) thick steel sheet, 1-inch (25.4 mm) wide exposed trim.
 8. Hinges: Concealed continuous piano hinge.
 9. Hardware: Self-latching key-operated bolt type, with interior release; for locking.
- G. Hardware:
1. Lock: Cylinder, keyed alike for project
 2. Lock for Fire Rated Access Doors: Rim cylinder.
 - a. Lock Preparation: Prepare door panel to accept cylinder specified in Section 087100 "Door Hardware."

2.4 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

- D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines or blend into finish.
- E. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
- F. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- G. Frame Anchors: Same type as door face.
- H. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.5 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
 - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
 - 3. Provide mounting holes in frames for attachment of units to metal or wood framing.
 - 4. Provide mounting holes in frame for attachment of masonry anchors.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. Non-Rated Doors: For cylinder locks, furnish two keys per lock and key all locks alike.
 - 2. Fire-Rated Doors: Cylinder and keys are specified in Section 087100 "Door Hardware."

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Metallic-Coated-Steel Finishes:
 - 1. Factory Prime: Apply manufacturer's standard, VOC-free, electrostatic-applied powder coat finish immediately after surface preparation and pretreatment.
- E. Stainless-Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.
- F. Aluminum Finishes:
 - 1. Mill finish and factory primed, as specified.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

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- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 083613 - SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of sectional overhead doors:

1. Doors with steel-framed, insulated steel panels.
2. Tracks configured for the following lift types:
 - a. Standard headroom.
3. Manual operation

B. Related Sections include the following:

1. Division 08 Section "Door Hardware" for lock cylinders and keying.

1.2 DEFINITIONS

A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:

1. Wind Load: Uniform pressure (velocity pressure) as indicated on Structural Drawings, acting inward and outward.

B. Operation-Cycle Requirements: Design sectional overhead door components and operator to operate for not less than 10,000 cycles.

1.4 SUBMITTALS

A. Product Data: For each type and size of sectional overhead door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:

1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
2. Summary of forces and loads on walls and jambs

B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.

- C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- D. Manufacturers' Certificates: Signed by manufacturers certifying that they comply with requirements specified in "Quality Assurance" Article. On request, submit evidence of manufacturing experience.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the sectional overhead door manufacturer for both installation and maintenance of units required for this Project.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing sectional overhead doors similar to those indicated for this Project and with a record of successful in-service performance.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, for the following period:
 - 1. Door Assemblies: Ten years covering delamination of polyurethane foam from steel faces, and three years for all other components

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Product: Provide specified products of Overhead Door Corporation or equal from one of the following manufacturers:
 - 1. McKee Door, Inc.; A United Dominion Company.
 - 2. Raynor Garage Doors
 - 3. Clopay Building Products Co..
 - 4. Wayne-Dalton Corp.
 - 5. Windsor Door; A United Dominion Company.

2.2 PRODUCTS

- A. Basis of Design Product: Provide 591 Thermacore Series by Overhead Door Corp. or equal.

2.3 DOOR STEEL SECTIONS

- A. Fabricate doors with metal/foam/metal sandwich panel construction, with PVC thermal break and weather-tight ship-lap design meeting joints.
 - 1. Panel Thickness: 1-5/8 inches
 - 2. Exterior Steel Sheet: Galvanized steel meeting ASTM A 653, commercial quality, with a minimum G60 zinc coating, in .015" minimum thickness.
 - 3. Exterior Face: Textured ribbed surface.
 - 4. End Stiles: 16 gauge galvanized steel with thermal break.
 - 5. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
 - 6. Thermal Values: R-value of 14.86; U-value of 0.067.
 - 7. Air Infiltration: 0.08 cfm at 15 mph; 0.08 cfm at 25 mph.
- B. Pass Door: Provide pedestrian pass door.
- C. Reinforce bottom section with a continuous channel or angle complying with bottom section profile and allowing installation of astragal.
- D. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized steel bars, struts, trusses or strip steel, formed to depth and bolted or welded in place.
- E. Provide reinforcement for hardware attachment.
- F. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints, and free of warp, twist, and deformation.
- G. Finish galvanized steel door sections with manufacturer's standard two-coat baked on polyester primer and finish coats to interior and exterior door faces after forming, according to coating manufacturer's written instructions for application, thermosetting, and minimum dry film thickness.
 - 1. Color and Gloss:
 - a. Interior: White
 - b. Exterior: Brown.

2.4 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Provide manufacturer's standard, galvanized steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, and complying with ASTM A 653, for minimum G60 zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track at 3 inches o.c. for door-drop safety device. Slope tracks at proper angle from vertical or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.
 - 1. Provide standard headroom track, 2 inch size.
- B. Track Reinforcement and Supports: Provide galvanized steel track reinforcement and support members, complying with ASTM A 36 and ASTM A 123. Secure, reinforce, and

support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.

- C. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling) tracks with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve and end of tracks.
- D. Weatherseals: Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom of overhead door.

2.5 HARDWARE

- A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Provide heavy-duty galvanized steel hinges, of not less than 0.0747-inch- thick uncoated steel, at each end stile and at each intermediate stile, per manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges, where required, for doors exceeding 16 feet in width, unless otherwise recommended by door manufacturer.
- C. Rollers: Provide heavy-duty rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- diameter roller tires for 3-inch track, 2-inch- diameter roller tires for 2-inch track.
- D. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
 - 1. Keyed Lock: Operable from exterior; provide lock cylinder of type specified in Division 08 Section "Door Hardware."

2.6 COUNTERBALANCING MECHANISM

- A. Torsion Spring: Operation by torsion-spring counterbalance mechanism consisting of adjustable-tension torsion springs, fabricated from oil-tempered-steel wire complying with ASTM A 229, Class II, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 7 to 1. Provide springs calibrated for 10,000 cycles minimum.
- B. Cable Drums: Provide cast-aluminum or gray-iron casting cable drums grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft. Provide 1 additional midpoint bracket for shafts up to 16 feet long and 2 additional brackets at one-third points to support shafts more than 16 feet long, unless closer spacing is recommended by door manufacturer.

- C. Cable Safety Device: Include a spring-loaded, steel or bronze cam mounted to bottom door roller assembly on each side, designed to automatically stop door if either cable breaks.
- D. Bracket: Provide anchor support bracket, as required to connect stationary end of spring to the wall, to level shaft and prevent sag.
- E. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.7 OPERATING MECHANISM

- A. Manual Operation: Provide chain hoist operating mechanism.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine wall and overhead areas, including opening framing and blocking, with Installer present, for compliance with requirements for installation tolerances, clearances, and other conditions affecting performance of Work of this Section.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install door, track, and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.
- B. Fasten vertical track assembly to framing at not less than 24 inches o.c. Hang horizontal track from structural overhead framing with angle or channel hangers welded and bolt fastened in place. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

3.3 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

END OF SECTION 083613

SECTION 084113 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior and interior storefront systems.
2. Exterior and interior entrance systems including manual-swing aluminum doors and door frames.
3. Installation of operable vents in storefront framing.

B. Related sections include the following:

1. Division 07 Section "Joint Sealants" for joint sealants installed as part of aluminum entrance and storefront systems.
2. Division 08 Section "Aluminum Windows" for operable windows inserted into storefront framing system.
3. Division 08 Section "Door Hardware."
4. Division 08 Section "Glazing."

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
3. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
4. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
5. Include interface and other details of operable windows installed in storefront framing.

C. Fabrication Sample: Of each vertical-to-horizontal intersection of systems, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:

1. Joinery.
2. Anchorage.
3. Expansion provisions.

4. Glazing.
5. Flashing and drainage.

- D. Qualification Data: For Installer
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems
- F. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
- G. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
 1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
- B. Source Limitations: Obtain all entrance and storefront systems, aluminum doors, and operable vent windows for the entire project through one source and from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 for substitutions.
 1. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code--Aluminum."
- E. Mockups: Prior to installing aluminum entrances and storefront system, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for Work.
 1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
 2. Include operable windows and glazing in mock-up.

3. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Obtain Architect's approval of mockups before start of Work.
 6. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.
- F. Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to glazed aluminum curtain wall system including, but not limited to, the following:
1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review required inspecting, testing, and certifying procedures.
 4. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions.
 5. Review requirements for coordinating installation of aluminum entrances and storefront framing with installation of electrical wiring and electrified hardware concealed in framing members

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.5 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
1. Warranty Period for Framing: 3 years from date of Substantial Completion.
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Failure of system to meet performance requirements.
 - c. Failure of operating components to function normally.
 - d. Water leakage through fixed glazing and frame areas.

2. Warranty Period for Finishes: 10 years from date of Substantial Completion.
 - a. Deterioration of metal finishes beyond normal weathering.
3. Warranty Period for Doors: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:
 1. Structural loads.
 2. Thermal movements.
 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 4. Dimensional tolerances of building frame and other adjacent construction.
 5. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferred to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 - d. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
 - g. Failure of operating units to function properly.
- B. Structural Loads:
 1. Wind Loads: Resist wind positive and negative pressures calculated according to International Building Code and Building Code of New York State, Section 1609:
 - a. Exterior Wind Loading Code Criteria: As indicated on Structural Drawings.
 - b. Interior Wind Loads: 5 psf
- C. Deflection of Framing Members:
 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below to less than 1/8 inch (3.2 mm) and clearance between members and operable units directly below to less than 1/16 inch (1.5 mm).
- D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity but not less than 10 seconds.
- E. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- F. Air Infiltration:
1. Storefront and Entrance Fixed Framing: When tested according to ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa) air leakage rate shall not exceed 0.06 cfm/sq. ft.
 2. Doors: When tested in accordance with ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. air leakage rate shall not exceed 1.0 cfm/lin. ft. of perimeter crack for single (3'-0" x 7'-0") door and pair of doors (6'-0" x 7'-0"),
- G. Water Penetration Under Static Pressure:
1. Storefront and Entrance Fixed Framing: When tested according to ASTM E 331, there shall be no leakage at a static-air-pressure differential of 10 psf as defined in AAMA 501.
- H. Condensation Resistance: When tested according to AAMA 1503 the CRF shall be not less than the following:
1. Storefront and Entrance Framing: 69 (frame) and 70 (glass).
 2. Doors: 49 (frame) and 68 (glass)
- I. Average Thermal Conductance: When tested according to AAMA 507 or NFRC 100 the overall U-factor (project specific) shall be no more than the following:
1. Storefront and Entrance Framing: 0.37
 2. Doors: 0.53
- 2.2 MANUFACTURERS
- A. Manufacturers: Provide specified products of Kawneer Company, Inc., an Arconic Company or equivalent products by one of the following:
1. EFCO Corporation.

2. YKK AP America Inc.

2.3 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
 1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
 2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221 (ASTM B 221M).
 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 4. Bars, Rods, and Wire: ASTM B 211 (ASTM B 211M).
 5. Welding Rods and Bare Electrodes: AWS A5.10.
- B. Steel Reinforcement: Complying with ASTM A 36 (ASTM A 36M) for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 (ASTM A 570M) for hot-rolled sheet and strip.
- C. Glazing as specified in Division 08 Section "Glazing."
- D. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.
- E. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.
- F. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.
- G. Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 07 Section "Joint Sealants."
- H. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.4 COMPONENTS

- A. Exterior and Interior (at Vestibules) Storefront and Entrance Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads. Provide outside captured pressure-plate type framing system, center glazed.
 1. Thermal-Break Construction: Kawneer DUAL Isolock™ Thermal Break with two (2) 1/4" (6.4 mm) separations consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront

- sections. Thermal break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505 .
2. Aluminum vertical and horizontal main frame extrusions shall have a minimum wall thickness of .070.
 3. Provide entrance framing members compatible with glass framing in appearance and provide single acting entrance frames with positive barrier weathering
 4. Provide heavy wall entrance door frames as required to support 2-1/4" heavy wall doors.
 5. Dimensions of Framing Members: Provide framing with vertical and horizontal framing members having a nominal face dimension of 2 inches and overall depth of 4-1/2 inches.
 6. Finish: Clear anodized
 7. Basis of Design Products: Provide Trifab 451UT by Kawneer Company, Inc., an Arconic Company or equal products of one of the following:
 - a. EFCO Corp.
 - b. Tubelite Inc.
- B. Exterior and Interior (at Vestibule) Doors: Manufacturer's standard thermally broken glazed doors, for manual swing operation.
1. Door Construction: 2-1/4 inch overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded.
 2. Thermal Break: Thermal break shall be IsoPour™ utilizing two continuous rows of polypropylene with a nominal 7/32" (5.5 mm) separation consisting of a two-part, chemically curing high density polyurethane which is mechanically and adhesively bonded to the aluminum at door rails and stiles.
 3. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets. Provide nonremovable glazing stops on outside of door. Glazing moldings shall be minimum .05" thick.
 4. Door Design: Wide stile; 5 inches wide.
 - a. Top Rail: 5 inches wide.
 - b. Mid Rail (Where indicated): 5 inches wide.
 - c. Bottom Rail: 10 inches wide
 5. Finish: Clear anodized.
 6. Basis of Design Product: Provide 500T Insulpour Thermal Entrance Doors by Kawneer Company, Inc., an Arconic Company or equal products of one of the following:
 - a. EFCO Corp.
 - b. YKK
- C. Interior Entrance Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads. Provide non-thermal, outside captured pressure-plate type framing system, center glazed.
1. Aluminum vertical and horizontal main frame extrusions shall have a minimum wall thickness of .080.
 2. Provide single acting entrance frames

3. Dimensions of Framing Members: Provide framing with vertical and horizontal framing members having a nominal face dimension of 1-3/4 inches and overall depth of 4-1/2 inches.
 4. Finish: Clear anodized.
 5. Basis of Design Product: Provide Trifab VersaGlaze 450 by Kawneer Company, Inc., an Arconic Company, or equal products of one of the following:
 - a. YKK.
 - b. EFCO Corp.
- D. Interior Doors: Manufacturer's standard narrow stile, non-thermal glazed doors, for manual swing operation.
1. Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded.
 2. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets. Provide nonremovable glazing stops on outside of door
 3. Door Design: Narrow stile; 2-1/8 inches wide.
 - a. Top Rail: 2-1/8 inches wide.
 - b. Mid Rail (Where indicated): 2-1/8-inches wide.
 - c. Bottom Rail: 10-1/4 inches wide
 4. Finish: Clear anodized.
 5. Basis of Design Products: Provide 190 Standard Entrance Doors by Kawneer Company, Inc., an Arconic Company, or equal products by one of the following:
 - a. YKK
 - b. EFCO
- E. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.
1. Provide all required accessories (fasteners, clips, brackets, supports, etc.) required for adjustment and installation as required by field conditions.
- F. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Reinforce members as required to retain fastener threads.
 2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
 3. Provide all required accessories (fasteners, clips, brackets, supports, etc.) required for adjustment and installation as required by field conditions.
- G. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

- H. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.
- I. Weather Stripping: Manufacturer's standard replaceable weather compression weather stripping of molded PVC complying with ASTM D 2287 requirements.
- J. Insulating Materials: Provide fiberglass batts for stuffing in openings and cracks.

2.5 PROJECTED WINDOWS

- A. Refer to Section 085113.

2.6 DOOR HARDWARE

- A. General: Provide hardware units indicated below in sizes, number, and type recommended by manufacturer for entrances indicated. Finish exposed parts to match door finish, unless otherwise indicated. All hardware shall be ADA compliant.
- B. Thresholds: At exterior doors, provide manufacturer's standard thermally broken threshold with cutouts coordinated for operating hardware, with anchors and jamb clips, and not more than 1/2-inch- (12.7-mm-) high, with beveled edges providing a floor level change with a slope of not more than 1:2, and in the following material:
 - 1. Material: Aluminum, bronze or clear finish to match doors and frames.
- C. Weather Stripping: Provide manufacturer's standard replaceable components.
 - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
 - 2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- D. Weather Sweeps: Provide manufacturer's standard weather sweep for application to exterior door bottoms and with concealed fasteners on mounting strips.
- E. Remainder of hardware is specified in Section 087100.

2.7 FABRICATION

- A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
 - 1. Fabricate components for screw-spline frame construction.
- B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

- C. Prepare components to receive concealed fasteners and anchor and connection devices.
- D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."
- G. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- H. Storefront: Fabricate framing in profiles indicated. Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.
- I. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.
 - 1. Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
 - 2. At exterior door bottom rail, provide an EPDM blade gasket sweep strip applied with concealed fasteners.
 - 3. Install door hinges at factory; field apply other hardware not supplied with the door and frame assemblies.
- J. Prefabrication: Complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible before shipment to the Project site. Disassemble components only as necessary for shipment and installation.
 - 1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.
 - 2. Do not drill and tap for surface-mounted hardware items until time of installation at project site. Refer to Division 08 Section "Door Hardware" for additional hardware installation requirements.
 - 3. Preglaze doors but do not preglaze framing system. Refer to Division 08 Section "Glazing" for specifications.

- K. Welding: Comply with AWS recommendations. Grind exposed welds smooth to remove weld spatter and welding oxides. Restore mechanical finish.
 - 1. Welding behind finished surfaces shall be performed in such a manner as to minimize distortion and discoloration on the finished surface.
- L. Reinforcing: Install reinforcing as required for hardware and as necessary for performance requirements, sag resistance and rigidity.
- M. Dissimilar Metals: Separate dissimilar metals with bituminous paint, or a suitable sealant, or a nonabsorptive plastic or elastomeric tape, or a gasket between the surfaces. Do not use coatings containing lead.
- N. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members.
- O. Fasteners: Conceal fasteners wherever possible.

2.8 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- D. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
- B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 Section "Joint Sealants."
 - 1. Install sill flashings with allowance for expansion and contraction at 12 feet on center. Seal expansion joint with manufacturer's recommended pliable sealing tape.
- E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
- F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
 - 1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.
- G. Install windows in storefront and entrance framing in compliance with manufacturer's directions and approved shop drawings. Comply with requirements of Division 08 Section "Aluminum Windows," unless otherwise indicated.
- H. Install glazing to comply with requirements of Division 08 Section "Glazing," unless otherwise indicated.
- I. Install perimeter sealant to comply with requirements of Division 07 Section "Joint Sealants," unless otherwise indicated.
- J. Install insulation materials in locations indicated, and at head and jamb of storefront system stuffed into openings, held above sill 1 inch (25 mm).
- K. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.

2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm). Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

3.3 ADJUSTING AND CLEANING

- A. Adjust windows, doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.
- B. Remove excess sealant and glazing compounds, and dirt from surfaces.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

3.5 HARDWARE SCHEDULE - Refer to Section 087100

END OF SECTION 084113

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes aluminum windows of the performance class and grade indicated. Window types required include the following:
 - 1. Awning.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 08 Section "Aluminum Entrances and Storefronts."
 - 2. Division 08 Section "Glazing."

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure, as demonstrated by testing manufacturer's standard window assemblies representing types, grades, classes, and sizes required for Project according to test methods indicated.
- B. Test Criteria: Testing shall be performed by a qualified independent testing agency based on the following criteria:
 - 1. Wind Loads: Provide aluminum windows capable of withstanding wind-load design pressures indicated on the Drawings.
 - 2. Test Procedures: Test window units according to ASTM E 283 for air infiltration, ASTM E 331 for water penetration, and ASTM E 330 for uniform load deflection and structural performance.
- C. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Performance Class and Grade: As indicated in the window type in Part - 2 below.
- D. Performance Requirements: Testing shall demonstrate compliance with requirements indicated in AAMA/WDMA/CSA 101/I.S.2/A440 for air infiltration, water penetration, and structural performance for type, grade, and performance class of window units required.
 - 1. Air-Infiltration Rate: Not more than quantity of cfm/ft. (cu. m/h per m) of operable sash joint for an inward test pressure of as indicated in lbf/sq. ft. (Pa) for the window type in Part - 2 below.
 - 2. Water Penetration: No water penetration as defined in the test method at an inward test pressure indicated in the window type in Part - 2 below.

3. Uniform Load Deflection: No deflection in excess of 1/175 of any member's span during the imposed load, for a positive (inward) and negative (outward) test pressure indicated in lbf/sq. ft. (Pa) for the window type in Part - 2 below.
4. Structural Performance: No failure or permanent deflection in excess of 0.4 percent of any member's span after removing the imposed load, for a positive (inward) and negative (outward) test pressure indicated in lbf/sq. ft. (Pa) for the window type in Part - 2 below.
5. Condensation Resistance: Where window units are indicated to be "thermally improved," provide units tested for thermal performance according to AAMA 1503.1 showing a minimum condensation resistance factor (CRF) as indicated for the window type in Part - 2 below.
6. Thermal Transmittance: Provide window units with a U-value maximum as indicated in Btu/sq. ft. x h x deg F (W/sq. m x K) at 15-mi./h (24-km/h) exterior wind velocity, when tested according to AAMA 1503.1, for the window type in Part - 2 below.
7. Forced-Entry Resistance: Comply with performance grade 10 requirements when tested according to ASTM F 588.
8. Thermal Movements: Provide window units that allow thermal movement resulting from the following maximum change (range) in ambient temperature when engineering, fabricating, and installing aluminum windows to prevent buckling, opening of joints, and overstressing of components, connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime sky heat loss.
 - a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.3 SUBMITTALS

- A. Product Data for each type of window required, including the following:
 1. Construction details and fabrication methods.
 2. Profiles and dimensions of individual components.
 3. Data on hardware, accessories, and finishes.
 4. Recommendations for maintaining and cleaning exterior surfaces.

- B. Shop Drawings showing fabrication and installation of each type of window required including information not fully detailed in manufacturer's standard Product Data and the following:
 1. Layout and installation details, including anchors.
 2. Elevations at 1/4 inch = 1 foot (1:50) scale and typical window unit elevations at 3/4 inch = 1 foot (1:20) scale.
 3. Full-size section details of typical composite members, including reinforcement and stiffeners.
 4. Location of weep holes.
 5. Panning details.
 6. Hardware, including operators.
 7. Window cleaning provisions.
 8. Glazing details.

9. Accessories.
10. Include details of interface with storefront and entrance framing system for windows inserted in storefront and entrance framing.

- C. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.
- D. Samples for Verification: 12-inch- (300-mm-) long sections of window members with applied finish. The Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.
- E. Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with performance requirements indicated based on comprehensive testing of current window units within the last 5 years. Test results based on use of down-sized test units will not be accepted.
- F. Qualification Data:
 1. For Installer to demonstrate their capabilities and experience. Provide evidence of acceptability from manufacturer for installation.
 2. For manufacturer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer acceptable to aluminum window manufacturer for installation of units required for this Project, who has completed installation of aluminum windows similar in material, design, and extent to those required for this Project and with a record of successful in-service performance.
- B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.
- C. Source Limitations:
 1. Obtain all aluminum windows for the entire project through one source and from a single manufacturer.
 2. Obtain aluminum windows inserted into storefront and entrance framing and storefront and entrance framing system from a single manufacturer.
- D. Product Options: The Drawings indicate sizes, profiles, dimensional requirements, and aesthetic effects of aluminum windows and are based on the specific window types and models indicated. Other aluminum window manufacturers whose products have equal performance characteristics may be considered provided deviations in size, profile, and dimensions are minor and do not alter the aesthetic effect. Refer to Division 01 Section regarding substitutions.
- E. Mock-ups: Provide windows for mock-up specified in Division 08 Section "Aluminum Entrances and Storefronts"

1.5 PROJECT CONDITIONS

- A. Field Measurements: Check window openings by field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.6 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Submit a written warranty signed by aluminum window manufacturer agreeing to repair or replace window components that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
 - 2. Faulty operation of sash and hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- C. Warranty Period: 2 years after date of Substantial Completion.
- D. Warranty Period for Glass: 10 years after date of Substantial Completion.
- E. Warranty Period for Metal Finishes: 20 years after date of Substantial Completion for painted finishes, 10 years for anodized finishes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: The drawings are based on windows by Kawneer, an Arconic Company. Provide specified products or equivalent products by one of the following:
 - 1. Wausau
 - 2. EFCO Corporation.

2.2 MATERIALS

- A. Aluminum Extrusions: Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, not less than 0.062 inch thick at any location for main frame and sash members.

- B. Fasteners: Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.
 - 1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard, noncorrosive, pressed-in, splined grommet nuts.
 - 2. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate. Where exposed fasteners are unavoidable, provide tamper-resistant fasteners.
- C. Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.
 - 1. Provide anchor clips or strap anchors for fastening windows in place.
- D. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when aluminum window is closed.
 - 1. Weather-Stripping Material: Manufacturer's standard system and materials.
- E. Sealant: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating. Comply with Division 07 Section "Joint Sealants" of these Specifications for installation of sealants.
- F. Wire-Fabric Insect Screen: 18-by-16 mesh of 0.011-inch-diameter, coated aluminum wire.
 - 1. Color: Charcoal Grey.
- G. Insulating Materials: Provide minimal-expanding, single-component polyurethane foam sealant packaged in a spray can and intended to be used to fill smaller cracks and gaps as perimeter seal.
 - 1. Basis of Design Product: Great Stuff Window and Door by DuPont, or equal

2.3 GLAZING

- A. Provide insulating glass unit of material and thickness as specified in Section 088000.

2.4 HARDWARE

- A. General: Where not indicated, provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended.

2.5 ACCESSORIES

- A. General: Provide manufacturer's standard accessories that comply with indicated standards.
- B. Insect Screens: Provide insect screens for each operable exterior sash or ventilator as scheduled. Locate screens on inside or outside of window sash or ventilator, depending on window type. Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches.
 - 1. Screen Frames: Fabricate frames of tubular-shaped, extruded- or formed-aluminum members of 0.050-inch- minimum wall thickness, with mitered or coped joints and concealed mechanical fasteners. Finish frames to match window units. Provide removable PVC spline-anchor concealing edge of screen frame.
 - 2. Provide screens for awning windows with wickets 3/4" x 1-1/8".
- C. Sills: Finished to match window. Provide where indicated.
 - 1. Extruded: .125 inch thick extruded aluminum.

2.6 FABRICATION, GENERAL

- A. General: Fabricate aluminum window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.
 - 1. Provide units that are reglazable without dismantling sash or ventilator framing.
- B. Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance, thermal barrier, located between exterior materials and window members exposed on interior, in a manner that eliminates direct metal-to-metal contact. Thermal barriers shall be designed in accordance with AAMA TIR A8.
 - 1. Structural thermal break made with glass-reinforced nylon strips, (closed cell PVC foam strips) installed by the window manufacturer in the frame and vent members.
- C. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- D. Preglazed Fabrication: Preglaze window units at the factory. Comply with glass and glazing requirements of Division 08 Section "Glazing" of these Specifications and AAMA 101.
- E. Window Fabrication, General:
 - 1. Provide minimum 0.062 inch thick extrusions for the main frame and sash member.

2. Provide units incorporating pressure equalization to direct water to the exterior through baffled weep holes and/or compression seals installed in the aluminum extrusion.
 3. Glazing Stops: Provide snap-on glazing stops, coordinated with glass selection and glazing system indicated. Finish to match window units.
- F. Weatherstripping: Provide full perimeter weatherstripping for each operable sash complying with AAMA 701/702. Provide sliding-type weatherstripping where sash rails slide horizontally or vertically along unit frame. Provide compression-type weatherstripping at perimeter of each operating sash where sliding type is inappropriate.
1. Provide weatherstripping locked into extruded grooves in sash.
- G. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.
- H. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.
- I. Sub Frames: Provide sub frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093-inch (2.4-mm) thick extruded aluminum. Miter or cope corners, and join with concealed mechanical joint fasteners. Finish to match window units. Provide sub frames capable of withstanding design loads of window units.
- 2.7 AWNING (PROJECT OUT) WINDOWS
- A. Window Performance Class and Grade: Comply with requirements of AAMA Performance Class and Grade AW-PG80-AP. Window units shall successfully pass life-cycle test requirements specified in AAMA 910.
- B. Hardware: Provide the following equipment and operating hardware:
1. Sash lock: Cast white bronze cam locks
 2. Hingers: 4-bar hinges
 3. Limit Device: Sash stop limit device; opening limit 4".
- C. Performance Requirements:

PERFORMANCE REQUIREMENTS							
Window Type(s)	Window Grade and Class	Air-Infil. Rate/ @ test pressure	Water Penetr.	Uniform Load Deflect.	Uniform Load Struct.	CRF frame	Thermal Trans.
Awning	AW-PG80	.1 cfm/ ft. of sash @ 6.24	15 psf	80 psf	120 psf	70	.44

- D. Frame Depth: 3-1/4"
- E. Basis of Design Product: Kawneer AA4325 Ultra Thermal Window or equal.

2.8 FINISHES

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
- B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- C. Class I, Clear Anodic Finish: AA-M10C21A41 (Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect openings before installation. Verify that rough or masonry opening is correct and sill plate is level.
 - 1. Masonry surfaces shall be visibly dry and free of excess mortar, sand, and other construction debris.
 - 2. Metal surfaces shall be dry; clean; free of grease, oil, dirt, rust and corrosion, and welding slag; without sharp edges or offsets at joints.

3.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for installing window units, hardware, operators, and other components of the Work.
- B. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.

1. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under "Dissimilar Materials" Paragraph in appendix to AAMA 101.
 2. Coordinate with installation of aluminum storefront and entrances where windows are inserted into storefront and entrance framing.
- C. Set sill members and other members in a bed of sealant or with joint fillers or gaskets, as shown on Shop Drawings, to provide weathertight construction. Refer to Division 07 Section "Joint Sealants" for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the Work.
1. Sealants, joint fillers, and gaskets to be installed after installation of window units are specified in another Division 07 Section.
- D. Install spray foam insulation at voids, openings and cracks between window frames and adjacent construction.

3.3 CLEANING

- A. Clean aluminum surfaces promptly after installing windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.
- B. Clean glass of preglazed units promptly after installing windows. Comply with requirements of Division 08 Section "Glazing" for cleaning and maintenance.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to aluminum window manufacturer, that ensure window units are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 085113

SECTION 085656 - TRANSACTION WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sliding transaction windows, fire-rated.

1.2 COORDINATION

- A. Coordinate installation of anchorages for transaction windows. 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 adjacent construction. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for window units.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
3. Include description of automatic closing device and testing and resetting instructions.

B. Shop Drawings: For transaction windows.

1. Include plans, elevations, sections, and attachments to other work.
2. Full-size section details of framing members, including internal armoring, reinforcement, and stiffeners.
3. Glazing details.
4. Keying information
5. Wiring diagrams.

C. Samples for Initial Selection: Of manufacturer's available colors for powder paint finish.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Operation and Maintenance Data: For sliding metal fire doors to include in emergency, operation, and maintenance manuals

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Pack transaction windows in wood crates for shipment.
- B. Label transaction window packaging with drawing designation.
- C. Store crated transaction windows on raised blocks to prevent moisture damage.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

- A. Horizontal sliding steel windows shall conform to the HS-C30 voluntary specifications in AAMA/NWWDA 101/I.S.2-97 and be designed to meet the performance requirements listed herein. Fire-rated windows shall bear the Underwriters Laboratories, Inc. label including the manufacturer's file number for the indicated rating.
- B. Fire Resistance: Fire resistance shall meet requirements established by ASTM E 163 and as tested and classified by Underwriters Laboratories Inc, in accordance with UL-9. Products shall meet the requirements of Underwriters Laboratories Inc. The Listing Mark of UL on the product will be accepted as evidence of compliance.
- 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.

2.2 SLIDING TRANSACTION WINDOWS

- A. Basis of Design Product: "Series 900 Horizontal Sliding Windows" manufactured by D.V. Fyre-Tec, Inc.; or approved equal.
- B. Horizontal sliding steel windows shall be designed for inside field glazing, and for glass types specified. Units shall be complete with glass and glazing.
- C. Fire-Rated Glazing Material (Laminated Ceramic Glazing Material): Provide Firelite Plus Premium by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products as specified in Section 088000. Glass fire rating shall meet opening rating requirements.
- D. Fire-rated windows shall conform to UL-9 and shall be labeled with a 1- hour fire-test rating as specified in the window schedule. Units shall be designed and fabricated to meet glass sizes, window sizes, and opening dimensions established by NFPA 80. Hardware shall conform to NFPA 80 requirements. Operable fire-rated windows shall be self-closing and positive latching and equipped with the following operator:
 - 1. Operator shall be electric employing the "McCabe Link, Model E5720H" with a release time of a maximum of one (1) minute. Automatic closure device shall be activated by heat rise, or by a fire or smoke alarm, computer or other electrical

signal. 24 or 110 volt actuation signal required; refer to electrical drawings for requirements.

2.3 FABRICATION

- A. General: Fabricate transaction windows to provide a complete system for assembly of components and anchorage of window units.
 - 1. Provide factory preglazed transaction windows.
- B. Framing: Miter or cope corners the full depth of framing; weld and dress smooth.
- C. Steel frames and inserts shall be fabricated from roll-formed galvanized lock-forming quality steel per ASTM A 653.
- D. Operable insert/sash shall be supported on two field adjustable roller trucks consisting of corrosion resisting steel with integral ball bearing rollers. Rollers shall be supported and operate on a stainless steel track.
- E. Glazing Stops: Finish glazing stops to match transaction window framing.
- F. Welding: Weld components to comply with referenced AWS standard. To greatest extent possible, weld before finishing and in concealed locations to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

2.4 ACCESSORIES

- A. Anchors, Fasteners, Clips, and Window Accessories: Stainless steel; hot-dip, zinc-coated steel or iron, complying with ASTM B 633.
- B. Sealants: For sealants required within fabricated transaction windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.

2.5 STEEL FINISH

- A. Provide powder coat painted finish, manufacturer's standard system, in color selected by Architect.

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 transaction windows.
- B. Examine in-place construction for compliance with manufacturer's installation requirements before transaction window installation.

- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of transaction windows.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing transaction windows to in-place construction. Include threaded fasteners for inserts, security fasteners, and other connectors.
- B. Fasteners: Install transaction windows using fasteners recommended by manufacturer with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel fasteners.
- C. Sealants: Comply with requirements in Section 079200 "Joint Sealants" for installing sealants, fillers, and gaskets.

3.3 ADJUSTING

- A. Remove and replace defective work, including transaction windows that are warped, bowed, or otherwise unacceptable.
- B. Adjust for smooth operation of sliding windows

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test release, closing, and alarm operations when activated by smoke detector or building's fire-alarm system. Test manual operation of window. Reset automatic-closing mechanism after successful test.
- B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

3.5 CLEANING AND PROTECTION

- A. Clean surfaces promptly after installation of transaction windows. Take care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.
- B. Clean glass of preglazed transaction windows promptly after installation.
- C. Provide temporary protection to ensure that transaction windows are without damage at time of Substantial Completion.

END OF SECTION 085656

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
 - a. "Metal Doors and Frames"
 - b. "Flush Wood Doors"
 - c. "Stile and Rail Wood Doors"
 - d. "Interior Aluminum Doors and Frames"
 - e. "Aluminum-Framed Entrances and Storefronts"
 - f. "Special Function Doors"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule

2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
 - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
 - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
 5. Key Schedule:
 - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
- C. Informational Submittals:
1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
 2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.
- D. Closeout Submittals:
1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.

- d. Final keying schedule
- e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
- f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

- 1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. Fire door assemblies, in compliance with NFPA 80.
 - b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

- 1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
- 2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
- 3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
- 4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

- 1. Fire-Rated Door Openings:
 - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
 - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
- 2. Smoke and Draft Control Door Assemblies:

- a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
 - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
3. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
 4. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
1. Keying Conference
 - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Requirements for key control system.
 - 4) Requirements for access control.
 - 5) Address for delivery of keys.
 2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
 3. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

- 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
- 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
- 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

- 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:

- 1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
- 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
- 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series

B. Requirements:

- 1. Provide hinges conforming to ANSI/BHMA A156.1.
- 2. Provide five knuckle, ball bearing hinges.
- 3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high

- b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
- 4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
- 5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
- 6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
- 7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
- 8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
- 9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

- 1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

- 1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
- 2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
- 3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
- 4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
- 5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
- 6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
- 7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin EPT-10

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.07 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage L9000 series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Provide motor based electrified locksets that comply with the following requirements:

- a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
 - b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.
 - c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
 - d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
 - e. Connections – provide quick-connect Molex system standard.
8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.

2.08 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin 98/35A series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

17. Special Options:

- a. SI
 - 1) Provide dogging indicators for visible indication of dogging status.

2.09 POWER SUPPLIES

A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product:
 - a. Schlage/Von Duprin PS900 Series

B. Requirements:

- 1. Provide power supplies approved by manufacturer of supplied electrified hardware.
- 2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
- 3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
- 4. Provide power supplies with the following features:
 - a. 12/24 VDC Output, field selectable.
 - b. Class 2 Rated power limited output.
 - c. Universal 120-240 VAC input.
 - d. Low voltage DC, regulated and filtered.
 - e. Polarized connector for distribution boards.
 - f. Fused primary input.
 - g. AC input and DC output monitoring circuit w/LED indicators.
 - h. Cover mounted AC Input indication.
 - i. Tested and certified to meet UL294.
 - j. NEMA 1 enclosure.
 - k. Hinged cover w/lock down screws.
 - l. High voltage protective cover.

2.10 CYLINDERS

A. Manufacturers:

- 1. Scheduled Manufacturer and Product:
 - a. Schlage Everest D Key system
- 2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

- 1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.11 KEYING

A. Scheduled System:

1. Existing factory registered system:
 - a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Permanent Keying:
 - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
 - b. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
 - d. Identification:
 - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
 - e. Quantity: Furnish in the following quantities.
 - 1) Permanent Control Keys: 3.
 - 2) Master Keys: 6.
 - 3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
 - 4) Key Blanks: Quantity as determined in the keying meeting.

2.12 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Telkee

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.13 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4040XP series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.14 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN Senior Swing

B. Requirements:

1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.
 - a. Opening: Powered by DC motor working through reduction gears.
 - b. Closing: Spring force.
 - c. Manual, hydraulic, or chain drive closers: Not permitted.
 - d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
 - e. Cover: Aluminum.

2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 1 to 32 seconds, and logic terminal to interface with accessories, mats, and sensors.
3. Provide drop plates, brackets, and adapters for arms as required to suit details.
4. Provide motion sensors and/or actuator switches, and receivers for operation as specified. Provide weather-resistant actuators at exterior applications.
5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.

2.15 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Size plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.16 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
 - a. Glynn-Johnson

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.17 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.18 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Zero International

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.19 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.20 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Schlage

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.
 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

- I. Lock Cylinders:
 - 1. Install construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as indicated in keying section.
 - 3. Furnish permanent cores to Owner for installation.

- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - 2. Connections to and from power supplies to electrified hardware.
 - 3. Connections to fire/smoke alarm system and smoke evacuation system.
 - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Connections to panel interface modules, controllers, and gateways.
 - 6. Testing and labeling wires with Architect's opening number.

- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

- L. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

- M. Overhead Stops/holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

- N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

- O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

- P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

- Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE





- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

Abbreviation	Name
ACC	Accurate Lock & Hardware Co
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	Lcn Commercial Division
SCE	Schlage Electronic Security
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International Inc

98333 OPT0340055 Version 1








Hardware Group No. 01

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PASSAGE SET	L9010 07A		630	SCH
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE








Hardware Group No. 02

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	L9080T 07A		630	SCH
1	EA	FSIC CORE	23-030 EV D		626	SCH
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE







Hardware Group No. 03

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
2	EA	MANUAL FLUSH BOLT	FB358		626	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	STOREROOM LOCK	L9080T 07A		630	SCH
1	EA	FSIC CORE	23-030 EV D		626	SCH
2	EA	OH STOP	90S		630	GLY
2	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 04

Provide each PR door(s) with the following:








QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
2	EA	PANIC HARDWARE	LD-9847-L-2SI-07		630	VON
2	EA	RIM CYLINDER	20-057 ICX		626	SCH
2	EA	RIM CYL THUMBTURN	XB11-979		630	SCH
2	EA	FSIC CORE	23-030 EV D		626	SCH
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	WALL STOP	WS406/407CVX		630	IVE
	EA	GASKETING	BY FRAME MANUFACTURER			

22 March 2024
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Katonah-Lewisboro Union Free School District
Additions and Alterations to Meadow Pond Elementary School
SED No. 66-01-01-03-0-007-016





Hardware Group No. 05

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056T 07A 09-544 L283-711		630	SCH
1	EA	FSIC CORE	23-030 EV D		626	SCH
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE







Hardware Group No. 06

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056T 07A 09-544 L283-711		630	SCH
1	EA	FSIC CORE	23-030 EV D		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	GASKETING	BY FRAME MANUFACTURER			








Hardware Group No. 07

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PASSAGE SET	L9010 07A		630	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 08

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
2	EA	FIRE EXIT HARDWARE	9827-L-BE-F-LBRAFL-07-499F		630	VON
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7850 AS REQ (12/24/120V AC/DC TRI-VOLT)		689	LCN
2	EA	MEETING STILE	328AA		AA	ZER
1	EA	GASKETING	488SBK PSA		BK	ZER








OPERATIONAL DESCRIPTION: MAGNETIC HOLD OPEN TIED INTO FIRE ALARM SYSTEM TO RELEASE UPON FIRE ALARM ACTIVATION.

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Hardware Group No. 09

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1WT 4.5 X 5		652	IVE
1	EA	CONST LATCHING BOLT	FB51P		630	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	NARROW BACKSET MORTISE LOCK	1756 29L 2R		630	ACC
1	EA	MORTISE CYLINDER	20-061 ICX CAM AS REQUIRED		626	SCH
1	EA	FSIC CORE	23-030 EV D		626	SCH
2	EA	OH STOP	100S		630	GLY
1	EA	GASKETING	BY FRAME MANUFACTURER			

Hardware Group No. CR01

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224HD EPT		628	IVE
2	EA	POWER TRANSFER	EPT10 CON		✂ 689	VON
1	EA	REMOVABLE MULLION	KR4954		689	VON
1	EA	ELEC PANIC HARDWARE	LXRX-LC-QEL-98-NL-CON 24 VDC		✂ 630	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-98-DT-CON 24 VDC		✂ 630	VON
1	EA	RIM CYLINDER	20-057 ICX TRIM		626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX CAM AS REQUIRED MULLION		626	SCH
2	EA	FSIC CORE	23-030 EV D		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	SURF. AUTO OPERATOR	9542 MS AS REQ (120/240 VAC)		✂ ANCL R	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA SRT AS REQUIRED		689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT		689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT		689	LCN
2	EA	ACTUATOR, TOUCH	8310-818T		✂ 630	LCN
2	EA	MOUNT BOX	8310-819F			LCN
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	EA	THRESHOLD	655A		A	ZER
2	EA	WIRE HARNESS	CON-XX-P LENGTH AS REQUIRED		✂	SCH
2	EA	WIRE HARNESS	CON-6W		✂	SCH
1	EA	CARD READER	BY SECURITY		✂	
2	EA	DOOR CONTACT	7764		✂ 628	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC		✂ LGR	SCE

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR CARD READER. CARD READER RETRACTS LATCHBOLT AND ENABLES EXTERIOR ACTUATOR. DOOR CAN BE MANUALLY PULLED OPEN OR AUTOMATICALLY OPERATED BY PUSHING ACTUATOR WHICH SIGNALS AUTOMATIC OPERATOR TO OPEN DOOR. INTERIOR ACTUATOR TO RETRACT LATCHBOLT AND SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT. REQUEST TO EXIT AND DOOR CONTACT CONNECTED TO BUILDING SECURITY SYSTEM

Hardware Group No. CR01-1

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224HD EPT		628	IVE
2	EA	POWER TRANSFER	EPT10 CON		✂ 689	VON
1	EA	REMOVABLE MULLION	KR4954		689	VON
1	EA	ELEC PANIC HARDWARE	LXRX-LC-QEL-98-L-NL-07-CON 24 VDC		✂ 630	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-98-L-DT-07-CON 24 VDC		✂ 630	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX CAM AS REQUIRED MULLION		626	SCH
2	EA	FSIC CORE	23-030 EV D		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	SURF. AUTO OPERATOR	9542 MS AS REQ (120/240 VAC)		✂ ANCL R	LCN
2	EA	ACTUATOR, TOUCH	8310-818T		✂ 630	LCN
2	EA	MOUNT BOX	8310-819F			LCN
1	EA	CARD READER	BY SECURITY		✂	
2	EA	DOOR CONTACT	7764		✂ 628	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC		✂ LGR	SCE
1	EA	GASKETING	BY FRAME MANUFACTURER			

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR CARD READER. CARD READER RETRACTS LATCHBOLT AND ENABLES EXTERIOR ACTUATOR. DOOR CAN BE MANUALLY PULLED OPEN OR AUTOMATICALLY OPERATED BY PUSHING ACTUATOR WHICH SIGNALS AUTOMATIC OPERATOR TO OPEN DOOR. INTERIOR ACTUATOR TO RETRACT LATCHBOLT AND SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT. REQUEST TO EXIT AND DOOR CONTACT CONNECTED TO BUILDING SECURITY SYSTEM

END OF SECTION

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
1. Windows.
 2. Doors.
 3. Interior borrowed lites, sidelights and transoms.
 4. Glazed entrances.
 5. Storefront framing.
 6. Transaction windows.
 7. Glazing film.

1.2 DEFINITIONS

- A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.
- B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- C. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
- E. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Where glass thicknesses are indicated these are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Where glass thickness is not indicated design glass thickness and types of glass required by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Wind Loads: Provide glazing capable of resisting wind positive and negative pressures calculated according to the New York Building Code Section 1609.6 and the following criteria:
 - 1) Basic Wind Speed (3 second gust) = as indicated on Structural Drawings
 - 2) Wind Load Importance Factor I_w = as indicated on Structural Drawings
 - 3) Wind Speed Category = as indicated on Structural Drawings
 - 4) Other applicable criteria indicated on Structural Drawings.
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - c. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch (25 mm), whichever is less.
 - 1) For insulating glass.
 - 2) For laminated glass
 - 3) For monolithic-glass lites heat treated to resist wind loads.
 - d. Minimum Glass Thickness for Exterior Lites: Not less than 1/4" (6 mm).
 - e. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6 mm thick, unless otherwise indicated.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch- (13-mm-) wide interspace, unless otherwise indicated.
 4. Center-of-Glass U-Values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program, expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
 5. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.
 6. Solar Optical Properties: NFRC 300.

1.4 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass and of 12-inch- (300-mm-) long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
1. Insulating glass for each designation indicated.
 2. Each type of laminated glass specified.
 3. Each type of fire-rated glass specified.
 4. For each color (except black) of exposed glazing sealant indicated.
 5. Each type of security glazing.
 6. Each type of window film specified
- C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
1. Indicate locations and extent of each type of glazing film to be provided
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- F. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- G. Product Test Reports: From a qualified testing agency indicating the following products comply with requirements, based on comprehensive testing of current products:
 - 1. Insulating glass.
 - 2. Coated float glass.
 - 3. Glazing sealants.
 - 4. Fire resistive glazing
 - 5. Security glazing
- H. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of glass from one primary-glass manufacturer.
- C. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer
- D. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
 - 1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- E. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
 - 1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
 - 2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
- F. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glass type, tape

sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants.

1. Use manufacturer's standard test methods to determine whether priming and other specific preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - a. Perform tests under normal environmental conditions replicating those that will exist during installation.
 2. Submit not fewer than nine pieces of each type and finish of glass-framing members and each type, class, kind, condition, and form of glass (monolithic, laminated, and insulating units) as well as one sample of each glazing accessory (gaskets, tape sealants, setting blocks, and spacers).
 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
 5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.
- G. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by UL, for fire ratings indicated, based on testing according to NFPA 252.
- H. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by UL, for fire ratings indicated, based on testing according to NFPA 257.
- I. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
 2. Safety glass includes fully tempered glass, laminated glass and fire-resistant glass.
- J. Fire-Rated Glass: Permanently mark fire-rated glass with certification label of certification agency acceptable to authorities having jurisdiction indicating manufacturer name, test standard and fire-rating.
- K. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines."

2. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
 3. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- L. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:
1. Insulating Glass Certification Council.
 2. Associated Laboratories, Inc.
 3. National Accreditation and Management Institute.
- M. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

1.8 WARRANTY

- A. General Warranty: 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. Manufacturer's Special Warranty on Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass manufacturer agreeing to furnish replacements for those coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements

for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.
- D. Manufacturer's Special Warranty on Laminated Glass: Written warranty, made out to Owner and signed by laminated-glass manufacturer agreeing to furnish replacements for laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: Five years from date of Substantial Completion.
 2. Warranty Period for Security Glass: Ten years from date of Substantial Completion.
- E. Manufacturer's Special Warranty on Fire Rated Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRIMARY FLOAT GLASS

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); Class 1 unless otherwise indicated in schedules at the end of Part 3.

2.2 HEAT-TREATED FLOAT GLASS

- A. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
- A. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent glass, flat); Quality q3 (glazing select); class, kind, and condition as indicated in schedules at the end of Part 3.

2.3 COATED FLOAT GLASS

- A. General: Provide coated glass complying with requirements indicated in this Article and in schedules at the end of Part 3.
 1. Provide Kind HS (heat-strengthened) coated float glass in place of coated annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.
- B. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment

(if any), and complying with other requirements specified in schedules at the end of Part 3.

1. Basis of Design Product: Solarban 70 by Vitro Architectural Glass (formerly PPG Industries, Inc.) or equal.

2.4 FIRE RATED GLAZING

- A. Fire-Rated Glazing Product (Laminated Ceramic Glazing Material): Proprietary Category I and II safety glazing product in the form of 2 lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch nominal thickness; polished on both surfaces, weighing 4 lb/sq. ft.; and as follows:
 1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Polished on both surfaces, transparent.
 3. Product: "FireLite Plus Premium" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.

2.5 LAMINATED GLASS

- A. Laminated Glass: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified, including those in the Laminated-Glass Schedule at the end of Part 3.
- B. Interlayer: Interlayer material as indicated below, clear or in colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
 1. Interlayer Material: Polyvinyl butyral sheets
 2. Interlayer Thickness: .030" except provide .060" thickness for laminating two lites of heat strengthened glass together, and where scheduled.
 3. Interlayer Color: Clear.
- C. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:
 1. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.
- D. Security Glazing: Laminated glass product consisting of outer layers of glass with a custom security, heat strengthened, chemically bonded core. The patent pending core reacts to physical abuse like metal and will bend, but will not tear or rip like other security products. Security glazing shall be designed to replace glass used in openings that would normally be glazed with 1/4" or 5/16" glass.
 1. Basis of Design Product: SG5 by School Guard glass, or equal.
 - a. Thickness: 7/16"
 - b. Ratings:

- 1) UL972
- 2) 5-aa1 rated for 12 minutes
- 3) ASTM F1233 Class 1.4 (tested to 5 minutes of class 1.5 until failure)

2.6 INSULATING GLASS

- A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.
- B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
- C. Sealing System: Dual seal, with primary and secondary sealants as follows:
1. Manufacturer's standard sealants.
- D. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
1. Aluminum with mill or clear-anodized finish.
 2. Desiccant: Molecular sieve or silica gel, or blend of both.
 3. Corner Construction: Manufacturer's standard corner construction.

2.7 ELASTOMERIC GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.
 4. Field-applied sealants shall have a VOC content of not more than 250 g/L.

- B. Single-Component Neutral-Curing Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 50; Uses NT, M, G, A, and, as applicable to joint substrates indicated, O.
 - 1. Products:
 - a. Dow Corning Corporation; 791.
 - b. Dow Corning Corporation; 795.
 - c. GE Silicones; SilPruf NB SCS9000.
 - d. GE Silicones; UltraPruf II SCS2900.
 - e. Pecora Corporation; 865.
 - f. Pecora Corporation; 895.
 - g. Pecora Corporation; 898
- C. Glazing Sealants for Fire-Resistive and Fire Protective Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
- B. Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
 - 1. Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
- C. Glazing Tapes for Fire-Resistive and Fire Protective Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

2.9 GLAZING GASKETS

- A. Glazing gaskets for storefront and entrance systems are specified in Division 08 Section "Aluminum-Framed Storefronts and Entrances".
- B. Glazing gaskets for all other sliding and swinging glazed doors and panels systems and glazed walls are specified in their respective Division 08 Sections.

2.10 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Silicone elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating
- H. Window Film: Provide film fabricated from PET, not PVC.
 - 1. Color and Pattern: As selected by the Architect.
 - 2. Basis of Design Product: 3M FASARA Window Film, by 3M Company, or equal products by one of the following:
 - a. LINTEC
 - b. LLumar by Eastman Performance Films

2.11 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.
- B. Grind smooth and polish exposed glass edges.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where the length plus width is larger than 50 inches (1270 mm) as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 PROTECTION AND CLEANING

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

3.8 GLASS SCHEDULE

A. Exterior Glazing:

- 1. Operable Windows and Storefront Framing: Provide 1 inch insulated glass as follows:
 - a. Outboard Lite: 1/4-inch thick clear, annealed glass, low-E coated on the second surface.
 - 1) Low-Emissivity Sputter Coating: Solarban 70; by Vitro Architectural Glass

- b. Air Space: 1/2 inch, argon filled.
 - c. Inboard Lite: 1/4-inch thick clear, annealed glass
 - d. Performance Characteristics:
 - 1) Visible Light Transmittance: Min 64%.
 - 2) Winter Nighttime U-Value: Max. 0.24
 - 3) Solar Heat Gain Coefficient (SHGC): Max. 0.27
 - 4) Light to Solar Gain: 2.37
 - 5) Outdoor Visible Light Reflectance: 12%
2. Storefront and Entrance Framing and Glazed Doors where Security Glazing is Scheduled: Provide 1 inch insulated laminated glass as follows:
- a. Outboard Lite: 1/4" thick clear, fully tempered glass (Kind FT), low-E coated on the second surface.
 - 1) Low-Emissivity Sputter Coating: Solarban 70; by Vitro Architectural Glass
 - b. Air Space: 5/16 inch, argon filled.
 - c. Inboard Lite: 7/16-inch thick clear, security glazing School Guard SG5.
 - d. Performance Characteristics:
 - 1) Visible Light Transmittance: Min 60%.
 - 2) Winter Nighttime U-Value: Max. 0.26
 - 3) Solar Heat Gain Coefficient (SHGC): Max. 0.27
- B. Interior Glazing, as Scheduled:
- 1. Non-Fire Rated Doors, Transoms, Sidelights and Borrowed Lights: 1/4 inch clear laminated glass.
 - a. Provide 7/16" SG5 laminated security glass product by School Guard Glass where indicated on Drawings
 - 2. Fire Rated Doors, Transoms, Sidelights and Borrowed Lights, and Transaction Windows: Laminated ceramic glazing material 5/16 inches thick; "FireLite Plus Premium" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.
 - 3. Interior Borrowed Lites, Where Indicated: Glazing film. Window film shall be applied to interior glass surfaces in locations as indicated on Drawings

END OF SECTION 088000

SECTION 089000 - LOUVERS AND VENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section Includes the Following:

1. Fixed, extruded-aluminum louvers.

B. Related Sections Include the Following:

1. Division 07 Section "Joint Sealants" for sealants installed in perimeter joints between louver frames and adjoining construction.
2. Division 23 Sections for louvers that are a part of mechanical equipment.

1.2 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers.

1. Wind Loads: Uniform pressure (velocity pressure) of 18 lbf per sq. ft. acting inwards.

B. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Air-Performance, Water-Penetration, Air-Leakage, and Wind-Driven Rain Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by

testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other Work. Show blade profiles, angles, and spacing.
- C. Samples for Verification: For each type of metal finish required.
- D. Product Certificates: Signed by manufacturers stating the location of the material manufacturer and the distance from the manufacturer to the Project site.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.
- B. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Basis-of-Design Product: The design for each louver is based on the product named. Subject to compliance with requirements, provide either the named product or approved equivalent by one of the other manufacturers specified.
 - a. Construction Specialties.
 - b. Airolite Co.
 - c. Reliable Metal Products.
 - d. Industrial Acoustics Company.

2.2 MATERIALS

- A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T5 or T-52.T-52.

- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Aluminum Castings: ASTM B 26/B 26M, alloy 319.
- D. Fasteners: Of same basic metal and alloy as fastened metal or 300 Series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.
 - 1. Use types and sizes to suit unit installation conditions.
 - 2. Use Phillips flat-head screws for exposed fasteners, unless otherwise indicated.
- E. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 FABRICATION, GENERAL

- A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Where indicated, provide subsills made of same material as louvers or extended sills for recessed louvers.
- F. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer, concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.4 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Single Drainable-Blade Louver:
 - 1. Basis-of-Design Product: Ruskin Model ELF375DX Drainable Stationary Louvers.
 - 2. Finish: Fluoropolymer 3-Coat System.
 - 3. Depth: 4-inches.

4. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than 0.081 inch.
5. Mullion Type: Fixed, hidden mullions shall allow for continuous line appearance for up to 120"
6. Performance Requirements:
 - a. Free Area: 54%.
 - b. Point of Beginning Water Penetration: 873 fpm at .01 oz/sf.
7. Sizes: Refer to Contract Drawings for sizes, configurations, and locations.
8. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.5 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 1. Screen Location for Fixed Louvers: Interior face.
 2. Screening Type: Bird screening. NO Insect screening allowed.
- B. Secure screens to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
 2. Finish: Same finish as louver frames to which louver screens are attached.
- D. Louver Screening for Aluminum Louvers:
 1. Bird Screening: Aluminum, 1/2-inch- (12.7-mm-) square mesh, 0.063-inch (1.6-mm) wire.

2.6 BLANK-OFF PANELS

- A. Insulated, Blank-Off Panels: Laminated panels consisting of an insulating core surfaced on back and front with metal sheets and attached to back of louver.
 1. Thickness: 1 inch (25 mm).
 2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch (0.81-mm) nominal thickness.
 3. Insulating Core: Rigid, glass-fiber-board insulation.
 4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard channel frames, with corners mitered and with same finish as panels.
 5. Seal perimeter joints between panel faces and louver frames with gaskets or sealant.
 6. Panel Finish: As selected by Architect.
 7. Attach blank-off panels with clips.

2.7 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish louvers after assembly.

2.8 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
- B. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Fluoropolymer 3-Coat System: Manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
 - a. Color(s): As selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.

- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
- F. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
- G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed surfaces of louvers that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089000

SECTION 092116.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Gypsum board shaft wall assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

- A. Fire-Resistance Rating: 1 hour and 2 hours as indicated.
- B. STC Rating: As indicated.
- C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
 - 1. Depth: 2-1/2 inches (64 mm), 4 inches (102 mm) and 6 inches (152 mm) as indicated on the Partition Type Drawing.
 - 2. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
- D. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches (51 mm) long and matching studs in depth.
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
- E. Room-Side Finish: As indicated.
- F. Shaft-Side Finish: Gypsum shaftliner board, moisture- and mold-resistant Type X.
- G. Insulation: Sound attenuation blankets.

2.3 PANEL PRODUCTS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Gypsum Shaftliner Board, Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with paper faces.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Lafarge North America, Inc.; Firecheck Type X Shaftliner.
 - b. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner.
 - c. USG Corporation; Sheetrock Brand Gypsum Liner Panel.
 - d. American Gypsum; Shaft Liner.
 - 2. Thickness: 1 inch (25.4 mm).
 - 3. Long Edges: Double bevel.
- C. Gypsum Shaftliner Board, Moisture- and Mold-Resistant Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with moisture- and mold-resistant core and surfaces.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Lafarge North America, Inc.; Firecheck Moldcheck Type X Shaftliner.
 - b. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner XP.
 - c. USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panel.
 - 2. Thickness: 1 inch (25.4 mm).
 - 3. Long Edges: Double bevel.
 - 4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

- D. Gypsum Board: As specified in Section 092900 "Gypsum Board."

2.4 NON-LOAD-BEARING STEEL FRAMING

- A. Steel Framing Members: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 1. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with manufacturer's written recommendations.
- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
- D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
 - 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing according to ASTM E 488 conducted by a qualified testing agency.
 - 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing according to ASTM E 1190 conducted by a qualified testing agency.
- E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from slag wool, or rock wool; Provide mineral-fiber SAFB.
- F. Acoustical Sealant: As specified in Section 079200 "Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Section 078100 "Applied Fireproofing."
- B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

- A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and ASTM C 754 other than stud-spacing requirements.
- B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.
 - 1. Reinforcing: Where handrails directly attach to gypsum board shaft wall assemblies, provide galvanized steel reinforcing strip with 0.033-inch (0.84-mm) minimum thickness of base metal (uncoated), accurately positioned and secured behind at least one layer of face panel.
- D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- F. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.
 - 1. Install control joints on 30 foot maximum centers, for all partitions, at locations indicated, and as detailed. Align control joints with door frames wherever

possible, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

- G. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.
- H. Cant Panels: At projections into shaft exceeding 4 inches (102 mm), install 1/2- or 5/8-inch- (13- or 16-mm-) thick gypsum board cants covering tops of projections.
 - 1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches (610 mm) o.c. with screws fastened to shaft wall framing.
 - 2. Where steel framing is required to support gypsum board cants, install framing at 24 inches (610 mm) o.c. and extend studs from the projection to shaft wall framing.
- I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.4 IDENTIFICATION

- A. Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:
 - 1. Be located in accessible concealed floor, floor-ceiling or attic spaces.
 - 2. Be repeated at intervals not exceeding 30 feet (914 mm) measured horizontally along the wall or partition.
 - 3. Include lettering not less than 0.5 inch (12.7 mm)) in height, incorporating the followings wording: "FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS," or other wording to reflect the wall type as indicated on the Code Summary Drawings.

3.5 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092116.23

SECTION 092150 - GYPSUM PLASTER REPAIR AND RESTORATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Repair of existing plaster on interior walls and ceilings to the extent indicated on drawings.
 - 2. Repair of existing plaster on interior walls and ceilings that requires cutting or removal to accommodate new conduit, piping, or other components of mechanical and electrical systems or other new construction.

1.2 SUBMITTALS

- A. Product Data consisting of manufacturer's product specifications and installation instructions for each product, including data showing compliance with specified requirements.
- B. Samples for verification in units at least 12 inches (300 mm) square of each type of finish indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.
- C. Material Certificates: Submit certificate signed by manufacturer for each kind of plaster aggregate certifying that materials comply with requirements.

1.3 QUALITY ASSURANCE

- A. Installer: A firm having not less than five (5) years successful experience in plaster work similar to work of this project.
- B. Workmen: Skilled plasterers who have demonstrated experience in the type of work specified and who are thoroughly familiar with the requirements of the work. In acceptance or rejection of plaster work, no allowance will be made for lack of skill on the part of the workmen.
- C. Single-Source Responsibility: Obtain gypsum plaster from one source and by a single manufacturer.
- D. Fire-Test-Response Characteristics: Where fire-resistance-rated plaster assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: As indicated by GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance

Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

- E. Mockups: Prior to proceeding with plaster repair and restoration work, prepare mock-up panels for each type of finish and application required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
1. Provide in-place 2' x 2' (min. size) sample of each type of repair work at existing plaster wall or ceiling surfaces to demonstrate quality of work expected in finished work in location directed by Architect.
 2. Execute mock-up in presence of Architect using all materials indicated for final Work including lath, support system, and control joints.
 3. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Obtain Architect's approval of mockups before proceeding with remainder of plaster repair and restoration work.
 6. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed plasterwork.
 7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packages, containers, or bundles, labeled with manufacturer's name, product brand name, and lot number.
- B. Store materials inside, under cover, and dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes. Protect plaster material from dampness and intrusion of foreign material.

1.5 PROJECT CONDITIONS

- A. Environmental Requirements, General: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application.
- B. Temperature Requirements: Maintain continuous uniform room temperature of not less than 40 deg F (4 deg C) nor more than 80 deg F (27 deg C) for at least 7 days before beginning plaster application, during its application, and until plaster is dry but for at least 7 days after application is complete. Distribute heat evenly; prevent concentrated or uneven heat from contacting plaster near heat source.
- C. Ventilation Requirements: Ventilate building spaces as required to remove water in excess of that required for hydrating plaster. Begin ventilation immediately after plaster is applied and continue until it sets.

- D. Protect contiguous work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Gypsum Plasters and Accessories:
 - a. National Gypsum Co.
 - b. United States Gypsum Co.

2.2 LATH

- A. Expanded-Metal Lath: Fabricate expanded-metal lath from uncoated or zinc-coated (galvanized) steel sheet to produce lath complying with ASTM C 847 for type, configuration, and other characteristics indicated below, with uncoated steel sheet coated after fabrication into lath.
 - 1. Diamond-Mesh Lath: Weighing 3.4 lb/sq. yd. (1.8 kg/sq. m).
 - a. Provide self-furring type for plastering directly on masonry, concrete, plywood and other flat surfaces.
 - b. Provide rib lath for ceiling locations.
 - c. Provide expanded metal flat diamond mesh lath for all other locations.

2.3 ACCESSORIES

- A. General: Comply with material provisions of ASTM C 841 and the requirements indicated below; coordinate depth of accessories with thicknesses and number of plaster coats required.
 - 1. Galvanized Steel Components: Fabricated from zinc-coated (galvanized) steel sheet complying with ASTM A 653, G40 (ASTM A 653M, Z90) minimum coating designation.
- B. Metal Cornerbeads: Type as indicated below, fabricated from zinc-coated (galvanized) steel.
 - 1. Type: Small nose with perforated flanges, for use on curved corners.
 - 2. Type: Small nose with expanded flanges reinforced by perforated stiffening rib, for use on columns and for finishing masonry corners.
 - 3. Type: Bull nose, radius 3/4 inch (19 mm) minimum, with expanded flanges, at locations indicated.

- C. Strip Reinforcement: Smooth-edge strips of expanded-metal lath fabricated from uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet coated after fabrication; in the following forms:
 - 1. Cornerite: Strips bent lengthwise in center for internal plaster angles not otherwise reinforced by metal lath lapped or carried around.
 - 2. Stripite: Flat strips for reinforcing joints in gypsum lath, nonmetallic bases, and between dissimilar plaster bases.

- D. Casing Beads: Square-edged style, with short or expanded flanges to suit kinds of plaster bases indicated; of the following material:
 - 1. Material: Zinc-coated (galvanized) steel.

- E. Control Joints: Prefabricated, zinc-coated (galvanized) steel; one-piece type with folded pair of nonperforated screeds in M-shaped configuration, with expanded or perforated flanges.
 - 1. Provide removable protective tape on plaster face of control joints.

2.4 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

- B. Bonding Compound: ASTM C 631.

- C. Repair and Reinforcing Tape: Open-mesh, glass fiber.

2.5 PLASTER MATERIALS

- A. Base-Coat Plasters: ASTM C 28, types as indicated below:
 - 1. High-strength gypsum neat plaster with a minimum, average, dry compressive strength of 2800 psi (19 MPa) per ASTM C 472 for a mix of 100 lb (45 kg) of plaster and 2 cu. ft. (0.06 cu. m) of sand.

- B. Finish-Coat Plasters: Gypsum Keene's cement, ASTM C 61.

- C. Finishing Hydrated Limes: ASTM C 206, type S, special hydrated lime for finishing purposes.

- D. Aggregates for Base-Coat Plasters: ASTM C 35, type as indicated below:
 - 1. Sand aggregate, unless otherwise indicated.

- E. Aggregates for Finish-Coat Plaster with Floated Finish: ASTM C 35, sand aggregate, graded per ASTM C 842.

- F. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. High-Strength Gypsum Neat Plaster:
 - a. Structo-Base; United States Gypsum Co.
 2. Gypsum Keene's Cement:
 - a. Red Top Keene's Cement; United States Gypsum Co.
 3. Finishing Hydrated Limes, Type S:
 - a. Ivory Finish Lime; United States Gypsum Co.
 - b. Snowdrift Finish Lime; United States Gypsum Co.

2.6 PLASTER MIXES AND COMPOSITIONS

- A. Plaster Base-Coat Compositions: Comply with ASTM C 842 and manufacturer's written instructions for plaster base-coat proportions that correspond to application methods and plaster bases indicated below:
1. Three-Coat Work over Masonry and Metal Lath: Base coats as indicated below:
 - a. Scratch Coat: High-strength gypsum plaster with job-mixed sand.
 - b. Brown Coat: High-strength gypsum plaster with job-mixed sand.
- B. Finish Coats: Proportion materials in parts by dry weight for finish coats to comply with the following requirements for each type of finish coat and texture indicated:
1. Troweled Finishes: Finish-coat proportion as indicated below:
 - a. Gypsum Keene's Cement: 2 parts plaster to 1 part lime.

2.7 MIXING

- A. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.
- B. Use materials without admixture of materials other than those specified herein in each instance. No retempering or retarding of partially set plaster mixes will be permitted, trade custom or local practices notwithstanding.
- C. Mix plaster in a batch type mixer at the construction site. Frozen, caked or lumpy material shall not be used. Clean mixer of all set or hardened material before materials for a new batch are loaded.
- D. Mix each batch of plaster separately. Thoroughly mix to obtain uniformity of color and workable consistency of mass and only in such quantities as will be used before it has started to set. Retempering after the plaster has started to set will not be permitted and such plaster shall be discarded.

- E. Machine mix special finishing hydrated lime with amount of water called for in printed directions of the manufacturer to form a putty and allow to stand for at least 15 minutes before using. Treat hydrated lime in a manner to obtain smooth or lump-free putty. Protect the putty from sun and take preventive measures to prevent excessive evaporation while stored.
- F. Batches for base coats shall not be in excess of an amount that can be entirely used within two hours. Batches for finish coats shall not be in excess of an amount that can be entirely used within 30 minutes.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine surfaces to which the work is to be attached or applied and notify Architect of existing conditions that are detrimental to the proper and expeditious installation of the work. Starting of work shall imply acceptance of surfaces to perform work as specified.

3.2 PROTECTION

- A. Exercise care to avoid soiling or spattering plaster onto the work of other trades. Use cover cloths or other suitable means of protection.
- B. Cover and protect furniture, equipment and fixtures to remain from soiling or damage when plaster repair work is performed in areas from which such items have not been removed.
- C. Take precautions to prevent unnecessary staining and smearing of floors by covering the floors with polyethylene.

3.3 PLASTER REMOVAL:

- A. Remove deteriorated plaster and corroded metal lath in areas indicated on drawings. Carefully remove all existing plaster that is loose, friable, bubbled, crumbling or otherwise deteriorated or unsuitable to remain. Make clean, sharp edges beveled inward to insure firm bond of new plaster.

3.4 INSTALLATION OF LATH AND FURRING, GENERAL

- A. Interior Lathing and Furring: Install materials indicated for plaster to comply with ASTM C 841.
- B. Isolation: Where lathing and metal support system abuts building structure horizontally and where partition or wall abuts overhead structure, sufficiently isolate from structural movement to prevent transfer of loading from building structure. Install slip- or cushion-type joints to absorb deflections but maintain lateral support.

1. Frame both sides of control joints independently and do not bridge joints with furring and lathing or accessories.

3.5 METAL LATHING

- A. Install expanded-metal lath for applications where plaster base coats are required. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated that comply with referenced lathing installation standards.

3.6 INSTALLATION OF PLASTERING ACCESSORIES

- A. General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and in alignment during plastering.
- B. Accessories: Provide the following types to comply with requirements indicated for location:
 1. Cornerbeads: Install at external corners.
 2. Casing Beads: Install at terminations of plaster work, except where plaster passes behind and is concealed by other work and where metal screeds, bases, or frames act as casing beads.
 3. Control Joints: Install at locations indicated or, if not indicated, at spacings and locations required by referenced standard, recommended by plaster manufacturer, and approved by Architect. Spacing between joints in either direction shall not exceed the following:
 - a. Partitions: 30 feet (9 m).

3.7 PLASTER APPLICATION, GENERAL

- A. Prepare monolithic surfaces for bonded base coats and use bonding compound to comply with requirements of referenced plaster application standards for conditioning monolithic surfaces.
- B. Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet (3 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed at any location on surface.
- C. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches (152 mm) at each jamb anchor.
- D. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.
- E. Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where plaster is not terminated at metal

frame by casing beads, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

- F. Apply thicknesses and number of coats of plaster as indicated or as required by referenced standards.
- G. Concealed Plaster: Where plaster application will be concealed by wood paneling, above suspended ceilings and in similar locations, finish coat may be omitted; where concealed behind cabinets, similar furnishings, and equipment, apply finish coat; where used as a base for adhesive application of tile and similar finishes, omit finish coat, coordinate thickness with overall dimension as shown, and comply with tolerances specified.

3.8 PLASTER APPLICATION

- A. Plaster Application Standard: Apply plaster materials, composition, mixes, and finishes indicated to comply with ASTM C 842.
- B. Execute work to provide a finish free from depressions, bulges, slick spots, scratches, brush and tool marks, cracks, visible joints, crazing, and discolorations. Surfaces shall have true planes, with uniform texture to match the adjoining surfaces and with lines and arises that are straight, plumb and level. Work shall be true to grounds and guidelines and free from blemishes and defects of any sort.
 - 1. Ventilation: During the application of each coat of interior plaster, keep the exterior openings closed until the plaster has set, then adjust for proper ventilation to regulate the drying and curing of the plaster.
 - 2. Thickness of Plaster: Match original thickness where patching.
 - a. Where plastering over existing walls in which existing surface is uneven and bumpy, adjust plaster thickness as much as possible to compensate for existing surface irregularities.
 - 3. Joints: Lap joints in succeeding coats including joints at interior angles; continue past the angle and corner and feather off on adjacent wall.
- C. Scratch (First) Coat:
 - 1. Apply plaster with sufficient materials and pressure to force plaster to form good bond with solid base material and cover well.
 - 2. Leave surface level.
 - 3. Scratch this coat and allow to set and thoroughly dry out before the application of the brown coat.
- D. Brown (Second) Coat:
 - 1. Do not apply brown coat until after scratch coat has hardened, not sooner than 48 hours after application of scratch coat. Evenly dampen scratch coat to provide uniform suction before brown coat is applied.

2. Prior to application of gypsum brown coat place plaster screeds at angles and corners and at intervals of 8' in both walls and ceilings unless grounds occur at smaller intervals.
3. Thickness of Brown Coat: Approximately 3/8". Bring brown coat out to ground and required lines, to true, even surfaces. Straighten with rod and darby and leave rough to accept finish coat.
4. Moist cure brown coat for 48 hours after application and then allow coat to set and dry out.

E. Finish Coat:

1. Thickness of Finish: 1/16 to 1/8 inch thick and treated and finished as directed.
2. Before application of finish coat, cut out shrinkage cracks and fill with scratch coat mortar.
3. Apply finish coats well ground to scratched surfaces, then double back and trowel down to a true plane, filling all imperfections. Delay troweling as long as possible and used only to eliminate uneven points and to force aggregate particles into the plaster surface. Avoid excessive troweling.
 - a. For smooth coat finish, trowel surface to a smooth, highly polished surface.
4. Finish surfaces plumb, straight, level, and true throughout, varying from a true plane by not more than 1/8" when tested with a 10' straightedge at any point and finish surface to match adjacent existing texture.

- F. Washdown: When plaster work has been completed, wash down the new plaster with a zinc sulphate solution (2 pounds per gallon of water) and allow to dry.

3.9 CUTTING AND PATCHING

- A. Cut, patch, replace, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.
- B. Leave plaster ready for painting.

3.10 PATCHING AND REPAIRS TO EXISTING PLASTER

- A. General: Provide patching and repairs to existing plasterwork that is damaged or deteriorated or has been disturbed to accommodate installation of new mechanical or electrical equipment or other construction. Make all such repairs and prepare all surfaces as required to obtain a complete and first class job, as required by job conditions. Comply with plaster manufacturer's recommendations for preparation of surfaces, including installation of lath.
- B. Preparation: Scrape and sand existing plaster surfaces to be repaired, removing all loose and peeling paint.

- C. Bonding Compound on Existing Plaster Surfaces: Apply bonding agent to existing plaster to receive new repair material and allow to dry until no longer tacky before proceeding.
 - D. Apply plaster, filling repaired areas in accordance with general plastering provisions described herein. Repair cracks, spalls, gaps and holes, restoring surfaces to a smooth, true, and flush condition.
 - E. Reinforce interior angles and flat joints with joint tape and embedding material to comply with ASTM C 843 and manufacturer's written recommendations.
 - F. Bumps and Wavy Surfaces: Thoroughly sand bumps and waves as much as possible and apply skim coats of plaster compound filling all depressions to obtain a smooth and true surface. Contractor may use spackling compound that is compatible for use over plaster if approved in advance by the Architect.
 - G. Fill hairline cracks with plaster flush and smooth. All other cracks shall have a channel cut along full length of crack of sufficient width to attain tight bond and to receive new plaster. Reverse cut side walls of channel to insure proper bonding of new plaster. Fill channel with successive coats specified herein bringing finish coat out flush for invisible appearance.
 - H. Skim coat plaster where base is sound but surface is cracked or crazed or surface was not originally an acceptable finish coat or where for other reasons surface is not hard, smooth, acceptable finish for scheduled surface treatment.
 - I. Do not apply plaster coat over any existing painted surfaces.
 - J. Execute pointing around fixtures, outlet boxes, switches, plates, piping, registers, and all other elements abutting or extending through plaster.
 - K. Repaired and patched areas shall match adjoining work in texture and finish.
- 3.11 CLEANING AND PROTECTING
- A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering. When plastering is completed, remove unused materials, containers, and equipment and clean floors of plaster debris.
 - B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure plaster work is without damage or deterioration at the time of Substantial Completion.
- 3.12 CURING
- A. Allow plaster to cure 30 days prior to application of paint or other finishes.

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Additions and Alterations to Meadow Pond Elementary School
SED No. 66-01-01-03-0-007-016

END OF SECTION 092150

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 DESCRIPTION

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized, unless otherwise indicated.
- B. Studs and Runners: ASTM C 645. EQ studs not permitted.
1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.0296 inch, 30 mils.
 - b. Depth: As scheduled on Drawings for each location.
- C. Slip-Type Head Joints: Provide one of the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous cold rolled channel bridging

- attached to each stud located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) ClarkDietrich; MaxTrak Slotted Deflection Track
 - 2) Steel Network Inc. (The); VertiClip SLD Series.
 - 3) Telling Industries; True-Action™ Slotted Track.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.033 inch, 33 mil.
- E. Cold-Rolled Channel Bridging and Bracing: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 1-1/2 inches (38 mm) unless otherwise indicated.
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm).
 2. Depth: 7/8 inch (22.2 mm) unless otherwise indicated.
- G. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical.
- H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 3/4 inch (19 mm) unless otherwise indicated.
 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch (0.8 mm).
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
 - a. Type: Postinstalled, chemical anchor or postinstalled, expansion anchor.
 - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm) by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
 - 1. Depth: 1-1/2 inches (38 mm) unless otherwise indicated on Drawings.
- F. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
 - 2. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.018 inch, 18 mil.
 - b. Depth: As indicated on Drawings.
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22 mm) deep.
 - a. Minimum Base-Metal Thickness: 0.018 inch, 18 mil.
 - 4. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical or hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 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. Armstrong World Industries, Inc.; Drywall Grid Systems.

- b. Chicago Metallic Corporation; Drywall Grid System.
- c. USG Corporation; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- E. Cutting, Notching and Boring Holes in Nonstructural Steel Wall Framing:
 - 1. Flanges and lips of nonstructural steel wall studs shall not be cut or notched.
 - 2. Holes in webs of nonstructural steel wall studs shall be permitted along the centerline of the web of the framing member, shall not exceed 1-1/2 inches (38 mm) in width or 4 inches (102 mm) in length, and the holes shall not be spaced less than 24 inches (610 mm) center to center from another hole or less than 10 inches (254 mm) from the bearing end.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
 - 1. Space studs at 16 inches (406 mm) o.c. unless otherwise indicated.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.

- c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.
- D. Install steel studs used as furring with clip angles at midpoint of wall span. Install additional clips to limit deflection to L/240 for walls finished with gypsum wall board and L/360 for walls finished with tile or plaster when subject to 5 psf (239 Pa) lateral load.
- E. Direct Furring: Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

- a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Cement board.
3. Sound-attenuation blankets

B. Related Requirements:

1. Section 092216 "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.3 QUALITY ASSURANCE

A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CertainTeed Corp.
 - 2. Georgia-Pacific Gypsum LLC.
 - 3. Lafarge North America Inc.
 - 4. National Gypsum Company.
 - 5. USG Corporation.
- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch (15.9 mm).
 - 2. Where drawings indicate regular type 5/8 inch (15.9 mm), provide 5/8 inch (15.9 mm) Type X indicated below.
 - 3. Long Edges: Tapered.
- C. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch (15.9 mm).
2. Long Edges: Tapered.

D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces, in 5/8 inch thickness unless otherwise indicated, with tapered edges; panels shall be classified as Type X

1. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
2. Products: Subject to compliance with requirements, provide one of the following or equal:
 - a. National Gypsum Company; Type XP/PR
 - b. United States Gypsum Co.; Mold Tough

E. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
4. Performance Data:
 - a. Surface Abrasion: ASTM C1629. Classification Level 2
 - b. Surface Indentation: ASTM C1629. Classification Level 1
 - c. Soft-body Impact Test: ASTM C1629. Classification Level 1
5. Products: Subject to compliance with requirements, provide one of the following or equal:
 - a. Protecta AR 100 Type X with Mold Defense; Lafarge North America Inc.
 - b. ProRoc Gypsum Board Panels; Certainteed, Division of BPB.

F. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

1. Thickness: 1/4 inch (6.4 mm).
 - a. Long Edges: Tapered

2.4 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.

1. Products: Subject to compliance with requirements, provide one of the following or equal:
 - a. CertainTeed Corp.; ProRoc Type C.
 - b. Lafarge North America Inc.; Firecheck Type C.
 - c. National Gypsum Company; Gold Bond Fire-Shield C.
 - d. USG Corporation; Firecode C Core.
2. Thickness: 5/8 inch (15.9 mm), unless otherwise indicated.
3. Long Edges: Tapered.
4. Provide where required by UL Design or NER 258.

2.5 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.; FiberCement BackerBoard.
 - b. Custom Building Products; Wonderboard.
 - c. James Hardie Building Products, Inc.; Hardiebacker 500.
 - d. National Gypsum Company, Permabase Cement Board.
 - e. USG Corporation; DUROCK Cement Board.
 2. Thickness: 1/2 inch (12.7 mm) or 5/8 inch (15.9 mm) as indicated.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
1. Material: Galvanized-coated steel sheet or rolled zinc
 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. Expansion (control) joint.
 - f. Curved-Edge Cornerbead: With notched or flexible flanges.
- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
 3. Finish:
 - a. Curved Drywall Trim: Corrosion-resistant primer compatible with joint compound and finish materials specified.
 4. Basis of Design Products:
 - a. Curved Drywall Trim: Provide Contura curved drywall trim by Gordon Inc. for locations indicated on the Drawings, in sizes required.

2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
1. Interior Gypsum Board: Paper.
 2. Tile Backing Panels: As recommended by panel manufacturer.

- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use factory mixed drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use factory mixed drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

- D. Joint Compound for Tile Backing Panels:
 - 1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

- C. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Provide mineral-fiber SAFB where required by the UL assembly.

- E. Acoustical Joint Sealant: As specified in Section 079200 "Joint Sealants"

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

1. Refer to Section 079200 for additional requirements.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Type X: Vertical surfaces unless otherwise indicated.
2. Ceiling Type: Ceiling surfaces.
3. Abuse-Resistant Type: As indicated on Drawings.
4. Moisture- and Mold-Resistant Type: As indicated on Drawings.
5. Type C: Where required for specific fire-resistance-rated assembly indicated.
6. Flexible Type: Apply in double layer at curved assemblies.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

A. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

B. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- (300-mm-) long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm) o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) o.c

3.4 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and where indicated.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
 1. Install control joints on 30 foot maximum centers, for all partitions, at locations indicated, and as detailed. Align control joints with door frames wherever possible, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.
 2. Install control joints at 50 foot maximum centers, with areas not to exceed 2,500 sq. ft. for all ceiling areas, at locations indicated, and as detailed.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners unless otherwise indicated.
 2. Bullnose Bead: Use where indicated.
 3. LC-Bead: Use at exposed panel edges.
 4. L-Bead: Use where indicated.
 5. Curved-Edge Cornerbead: Use at curved openings.
- D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 4: At all panel surfaces that will be exposed to view unless otherwise indicated.
 - 4. Level 5: Provide Level 5 finish at all areas where wall washed lighting is indicated and at surfaces scheduled to receive gloss paint, and elsewhere specifically indicated on Drawings and schedules.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 IDENTIFICATION

- A. Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:
 - 1. Be located in accessible concealed floor, floor-ceiling or attic spaces.
 - 2. Be repeated at intervals not exceeding 30 feet (914 mm) measured horizontally along the wall or partition.
 - 3. Include lettering not less than 0.5 inch (12.7 mm)) in height, incorporating the followings wording: "FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS," or other wording to reflect the wall type as indicated on the Code Summary Drawings.

3.8 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093100 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Porcelain tile
 - 2. Ceramic tile
 - 3. Trim and edge accessories.
 - 4. Waterproof membrane for tile installations
 - 5. Stone thresholds.
- B. Sealing of expansion, contraction, control, and isolation joints in tile surfaces is specified in Division 07 Section "Joint Sealant."

1.2 ACTION SUBMITTALS

- A. Product data for each type of product specified.
- B. Samples of each color of tile, marble threshold, or accessory to be provided, for verification purposes.
- C. Samples of grout demonstrating full range of colors available, for initial selection purposes.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.
- C. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

- D. Unit Mock-up: Provide mock-up on a board min. 2' x 2' in size, one for each different tile and grout color to be provided in the work; for final approval of grout color before ordering grout.
- E. In-Place Mock-up: Prepare mock-ups of types indicated below following requirements of this section. Reprepare mock-ups as many times as required by Architect until satisfactory result is obtained, as judged solely by Architect. Obtain Architect's approval of visual qualities before proceeding with work. Protect approved mock-ups until all work has been completed. Approved mock-ups will represent the minimum standard of acceptability for each portion of the work.
 - 1. Provide in-place sample minimum 5' x 5' of typical flooring layout in location directed by Architect

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.
- C. Maintain temperatures at 50 deg F (10 deg C) or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.7 EXTRA MATERIALS

- A. Extra Materials: Furnished from same production run as ceramic tile installed. Furnish 5% of each type and color of flooring material and 2% of each type and color of wall tile material provided in the work. Package materials with protective covering and identify with labels describing contents. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturers: The design for each tile type and other material specified is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the following manufacturers:
1. Tile:
 - a. American Olean; Div. of Dal-Tile International Corp
 - b. Creative Materials Corp.
 - c. Crossville Inc
 - d. Daltile; Div. of Dal-Tile International Inc.
 - e. Garden State Tile
 - f. Olympia Tile
 - g. Florida Tile Industries, Inc.
 - h. Summitville Tiles, Inc.
 - i. United States Ceramic Tile Company
 2. Mortars and Grouts:
 - a. Bostik Construction Products Div. (Hydroment)
 - b. Laticrete International Inc.
 - c. Mapei Corp.
 - d. TEC Specialty Construction Brands Inc.
 3. Waterproofing Membranes: The Noble Co.
 4. Termination, Trim and Transition Strips: Schluter

2.2 PRODUCTS, GENERAL

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.
1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.
- B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
1. Match color, texture, and pattern indicated by reference to manufacturer's standard designations for these characteristics.
 2. Provide tile trim and accessories that match color and finish of adjoining flat tile.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

- E. Large Format Tiles: Large format tiles are defined to be tiles with any one single side larger than 15".

2.3 TILE PRODUCTS

- A. Porcelain Floor Tile PT1: DalTile, "Portfolio Vivid", in color Electric Blue PF25; 12" x 24" x 5/16" thick, matte finish
 - 1. Location: Toilet Rooms
 - 2. Pattern: Monolithic.
 - 3. Grout Color: Laticrete Slate Grey 91
- B. Ceramic Wall Tile CT1: DalTile, "Colorwheel Linear"; color Arctic White 0190; 4" x 12" x 5/16" thick, Gloss.
 - 1. Location: Toilet Rooms
 - 2. Pattern: Full height stack bond.
 - 3. Grout Color: Laticrete Bright White 44
- C. Trim Units: Provide tile trim units with inside and outside corners and to comply with following requirements:
 - 1. CTB: American Olean, "Color Story Wall"; flat top cove base #A34C1MOD; color Balance 0014; 4" x 12" x 5/16" thick, Gloss

2.4 STONE THRESHOLDS

- A. General: Provide stone that is uniform in color and finish, fabricated to sizes and profiles indicated or required to provide transition between tile surfaces and adjoining finished floor surfaces.
 - 1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch (12.7 mm) or less, and finish bevel to match face of threshold.
- B. Marble Thresholds: Provide marble thresholds complying with ASTM C 503 requirements for exterior use and for abrasion resistance where exposed to foot traffic, a minimum hardness of 10 per ASTM C 241.
 - 1. Provide white marble thresholds.

2.5 WATERPROOFING/CRACK ISOLATION FOR TILE INSTALLATIONS

- A. General: Provide products that comply with ANSI A118.10 and the descriptions in this Article.
- B. Polyethylene-Sheet Waterproofing: Manufacturer's standard proprietary product consisting of composite sheets, 60 inches (1524 mm) wide by a nominal thickness of 0.030-inch (0.76 mm), composed of an inner layer of nonplasticized, chlorinated

polyethylene sheet faced on both sides with laminated, high-strength, nonwoven polyester material, designed for embedding in latex-portland cement mortar and as the substrate for latex-portland cement mortar setting bed. Provide at all locations for thin-setting.

1. Products: Provide Nobleseal TS manufactured by the Noble Company, or approved equal.
2. Location: Use at all thin set tile floors in bathrooms.

2.6 SETTING MATERIALS

A. Medium-Bed, Latex-Portland Cement Mortar. Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of up to 3/4 inch. Provide one of the following, or approved equal:

1. MegaLite® Ultimate Crack Prevention Large Format Tile Mortar by Custom Building Products.
2. 4-XLT by Laticrete.
3. Large Tile and Stone Mortar by Mapei

B. Latex-Portland Cement Mortar: Two component mortar system, comply with ANSI A118.4. Provide one of the following, or approved equal:

1. Laticrete 317 with Laticrete 333 additive; Laticrete International, Inc.
2. Kerabond with Keralastic; Mapei Corp.
3. Or equivalent.

2.7 GROUTING MATERIALS

A. Water-Cleanable Epoxy Grout for General Use: ANSI A118.3. with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24). Grout shall be stain resistant, color fast, mold and mildew inhibiting, non-sag, suitable for joints 1/16" to 1/2" and sanded type suitable for installing with glazed tiles.

1. Basis of Design Product: Laticrete "Spectralock Pro Epoxy Grout" or equal.
2. Colors: As selected by Architect.

2.8 MISCELLANEOUS MATERIALS

A. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8-inch wide at top edge with integral provision for anchorage to mortar bed or substrate unless otherwise indicated.

B. Notched Trowel: Use type recommended by tile manufacturer for setting large-format tiles, for setting bed thickness utilized.

C. Termination, Trim and Transition Strips: Provide Schluter units in aluminum as scheduled below, or indicated on Drawings.

1. Wall Tile Outside Corners Trim: Jolly

- D. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by tile manufacturer for applications indicated.
- E. Grout Release: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 - 1. Mapei "UltraCare Grout Release".
 - 2. Miracle Sealants Co. "511 Impregnator"
- F. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- G. Grout Sealers: Water-based sealer for tile for protection from stains, as follows:
 - 1. Mapei "UltraCare Grout Sealer".
 - 2. Miracle Sealants Co. "511 Impregnator"

2.9 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 - 3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.
 - 4. Perform moisture test at rate of one per 2,000 sq.ft.
 - 5. Verify that concrete substrates are within the flatness tolerances required for setting large format tiles.

- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive tile.
- B. Use trowelable leveling and patching compounds per manufacturer's directions to fill cracks, holes, and depressions in substrates and to patch and level floors as required to provide suitable substrate for tile application.
- C. Remove coatings, including curing compounds, and other substances that could interfere with adhesion of tile by using a grinder, sander, or polishing machine with a heavy-duty wire brush.
- D. Broom or vacuum clean substrates to be covered by tiles immediately before tile installation. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
- E. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- F. Transitions: Transitions of floor surfaces must be level. Use transition and edge pieces as required to obtain level abutting surfaces, meeting ADA requirements.
- G. For large format tiles thin-set with medium bed mortar, provide the following surface preparation:
 - 1. Level floor substrates to 1/8-inch variance in 10 feet, with no more than 1/16 inch variation in 24 inches by one of the following methods:
 - a. Provide self-leveling hydraulic cement underlayment throughout project where new floor tile is installed.
 - b. Grind concrete floor substrates and patch with trowelable leveling and patching compound to achieve indicated flatness..
 - 2. There shall be no abrupt irregularities greater than 1/32"

3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.
- B. TCNA Installation Guidelines: TCNA "Handbook for Ceramic Tile Installation"; comply with TCNA installation methods indicated.

- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.
 - 1. Cut and grind tile edges where they abut curved surfaces to produce a close and uniform abutting joint.
- E. Jointing Pattern: Lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
- F. Tile Patterns: Comply with pattern indicated on drawings.
- G. Expansion Joints: Provide expansion joints, control joints and pressure relieving joints of widths and at locations as per TCNA Handbook Construction #EJ171. Do not saw cut joints after installation of tiles.
 - 1. Sealing of joints is included in Division 07 Section "Joint Sealers."
- H. Apply grout release to tile surfaces prior to grouting. Prepare a small mock-up area of grout release application for Architect's approval before proceeding with application of grout release to installed tile surfaces.
- I. Grout tile to comply with ANSI A108.10.

3.4 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.
- B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR INSTALLATION METHODS

- A. Floor Tile: Install tile to comply with requirements indicated below for setting bed methods, TCNA installation methods related to types of subfloor construction, and grout types:
 - 1. Concrete subfloor with waterproofing/crack suppression membrane, TCNA F205 modified to comply with membrane manufacturer's installation instructions, details on drawings and as follows:

- a. Bond Coat for Membrane: Medium-Bed, Latex-Portland Cement Mortar, ANSI A108.5 over subfloor.
 - b. Sheet membrane over bond coat, extend up walls 4 inches
 - c. Bond Coat for Tile: Medium-Bed, Latex-Portland Cement Mortar—ANSI A108.5 over membrane
 - d. Grout: Epoxy grout.
 - e. Provide at toilet room floors.
- B. Joint Widths: 1/8"
- C. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
- D. Transition Strips: Install at all edges where new tile meets existing flooring to ensure a smooth transition meeting ADA requirements.
- E. Stone Thresholds: Install stone thresholds at tile transitions at restrooms. Allow for bevel/chamfer as required. Set in same type of setting bed as abutting field tile unless otherwise indicated. Sealant is specified in Section 079200.
- 3.6 WALL INSTALLATION METHODS
- A. Wall Tile: Install tile to comply with requirements indicated below for setting-bed methods, TCNA installation methods related to subsurface wall conditions, and grout types:
1. Gypsum Board and Cement Board - TCNA W243, and as follows:
 - a. Bond Coat for Tile: Latex-portland cement mortar, ANSI A108.5 over gypsum board.
 - b. Grout: Epoxy.
- B. Joint Widths: 1/16".
- 3.7 CLEANING AND PROTECTION
- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
1. Remove grout residue from tile as soon as possible.
 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.

1. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 093100

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes ceilings consisting of acoustical panels and exposed suspension systems.
- B. Related Sections include the following:
 - 1. Acoustical sealants are specified in Division 07 Section "Joint Sealants"

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product specified
- B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
 - 1. Ceiling suspension members.
 - 2. Method of attaching hangers to building structure.
 - 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - 4. Minimum Drawing Scale: 1:100
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on samples of size indicated below.
 - 1. 6-inch- (150-mm-) square samples of each acoustical panel type, pattern, and color.
 - 2. Set of 12-inch- (300-mm-) long samples of exposed suspension system members, including moldings, for each color and system type required.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicate compliance of acoustical panel ceilings and components with requirements based on comprehensive testing of current products.
- B. Research/Evaluation Reports: Evidence of acoustical panel ceiling's and components' compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
- C. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer..
- C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
 - a. Smoke-Developed Index: 450 or less

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges, soiling panels or damaging units in any way.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

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. Acoustical Ceiling Components: 2% of each type of panel installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Products: Subject to compliance with requirements, provide specified products by Armstrong World Industries or equivalent products by one of the following:
1. CertainTeed
 2. USG Interiors

2.2 ACOUSTICAL PANELS

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring Noise Reduction Coefficient: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.

- B. Acoustical Panels for Acoustical Panel Ceiling ACT 1: Provide panels complying with the following:

1. Classification: Panels fitting ASTM E 1264 for Type IV, wet-formed mineral fiber with membrane-faced overlay; Form 2, water felted.
2. Pattern: Panels fitting ASTM E 1264 pattern designation (description) E (lightly textured).
3. Color: White.
4. Noise Reduction Coefficient: 0.75
5. Ceiling Attenuation Class: 35
6. Light Reflectance Coefficient: Not less than LR 0.88.
7. Fire Rating: Class A
8. Sag Resistance Treatment: Armstrong HumiGuard Plus
9. Anti-Mold and Mildew Treatment: BioBlock+
10. VOC: GREENGUARD Gold Certified low VOC emissions
11. Warranty: 30 year
12. Edge Detail: Beveled tegular.
13. Thickness: 3/4 inch.
14. Size: 24 by 24 inches.
15. Basis of Design Product: Armstrong Ultima Tegular #1911HRC
16. Location: General.

- C. Acoustical Panels for Acoustical Panel Ceiling ACT-2: Where this designation is indicated, provide panels complying with the following:

1. Classification: Panels fitting ASTM E 1264 for Type XII, fiberglass with membrane-faced overlay; Form 2, water felted.
2. Pattern: Panels fitting ASTM E 1264 pattern designation (description) E (lightly textured).

3. Color: White.
4. Light Reflectance Coefficient: Not less than LR 0.88.
5. Noise Reduction Coefficient: 0.80
6. Ceiling Attenuation Class: N/A
7. AC: N/A
8. Fire Rating: Class A
9. Sag Resistance Treatment: Armstrong HumiGuard Plus
10. Anti-Mold and Mildew Treatment: BioBlock
11. Binder: Plant based
12. Warranty: 10 year
13. Edge Detail: Square all edges (for direct apply)
14. Thickness: 1 inch.
15. Size: 24 by 24 inches.
16. Basis of Design Product: Armstrong Lyra with Plant Based Binder (PB) Direct Apply #8400PB, or equal.

2.3 METAL SUSPENSION SYSTEMS

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.
 1. Provide fire-resistance rated metal suspension system where indicated
- B. Suspension System for Acoustical Panel Ceilings ACT-1: Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z120) coating designation, with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges; other characteristics as follows:
 1. Structural Classification: Intermediate-duty system.
 2. End Condition of Cross Runners: Override (stepped) or butt-edge type, as standard with manufacturer.
 3. Face Design: Flush face.
 4. Cap Material: Steel sheet.
 5. Cap Finish: Manufacturer's standard factory-applied painted finish in white.
 6. Basis of Design Product: Armstrong Prelude XL.
- C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
 1. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.
- E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish and color as that used for exposed flanges of suspension system runners.
- F. Adhesive for Direct Apply Panels: Titebond GREENchoice Acoustical Ceiling Tile Adhesive, or equal.

2.4 ACOUSTICAL SEALANT

- A. Refer to Division 07 Section "Joint Sealants".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of acoustical panel ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.
- B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.
- C. Prepare surfaces to receive direct apply panels in accordance with manufacturer's directions for substrates receiving the adhered panels.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and Cisca's "Ceiling Systems Handbook."

1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
- B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Do not attach hangers to steel deck tabs.
 6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 7. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches (200 mm) from ends of each member.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m). Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans.

- F. Installation of Direct Apply Panels: Apply adhesive spots to back of panels at spacing recommended by manufacturer for substrate indicated on Drawings.
 - 1. Install a small test area of panels on substrate and check for proper adhesion after 12 hours. Do not apply the remainder of the panels until acceptable adhesion has been attained.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096500 - RESILIENT FLOORING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Homogeneous vinyl tile.
 - 2. Luxury vinyl tile
 - 3. Vinyl composition tile.
 - 4. Rubber wall base.
 - 5. Resilient flooring accessories.

1.2 ACTION SUBMITTALS

- A. Product data for each type of product specified.
- B. Samples for verification purposes in form of actual flooring or sections of accessories for each color and pattern specified.
- C. Shop Drawings: Indicate decorative pattern layout, if any. Show location of seams and edges. Indicate location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutout locations.

1.3 INFORMATIONAL SUBMITTALS

- A. Maintenance data for resilient flooring and accessories.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility for Floor Tile and Accessories: Obtain each type, color, and pattern of tile and accessory from a single source; all stair accessories shall be from one manufacturer.
- B. Fire Performance Characteristics: Provide resilient flooring with the following fire performance characteristics as determined by testing products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class 1, per ASTM E 648 or NFPA 253.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient materials on flat surface in dry space protected from the weather with ambient temperatures maintained between 50 deg F (10 deg C) and 90 deg F (32 deg C).

- B. Move floor coverings and installation accessories into spaces where they will be installed at least 48 hours before installation, unless longer conditioning periods are recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

- A. Maintain a minimum temperature of 70 deg F (21 deg C) in spaces to receive resilient flooring for at least 72 hours prior to installation, during installation, and for not less than 72 hours after installation. After this period, maintain a temperature of not less than 55 deg F (13 deg C).
- B. Moisture Testing of Concrete Substrates: Perform moisture tests recommended by manufacturer and as follows:
 - 1. Testing Procedures: Perform calcium chloride or moisture meter tests as required by floor topping and resilient tile manufacturers.
 - a. Calcium Chloride Testing: Anhydrous calcium chloride test, ASTM F 1869.
 - b. Moisture Meter Testing: Relative humidity test using in situ probes, ASTM F 2170.
 - 2. Proceed with installation only after substrates do not exceed maximum moisture-vapor-emission rate or relative humidity level measurement acceptable to flooring material manufacturer.
- C. Do not install flooring or accessories until they are at the same temperature as the space where they are to be installed.
- D. Close spaces to traffic during flooring installation.

1.7 SEQUENCING AND SCHEDULING

- A. Install flooring and accessories after other finishing operations, including painting, have been completed.

1.8 EXTRA MATERIALS

- A. Extra Materials: Furnished from same production run as resilient tile, base and accessories installed. Furnish 5% of each type and color of material provided in the work. Package materials with protective covering and identify with labels describing contents. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

1. Tiles:
 - a. Armstrong World Industries
 - b. Mannington
 - c. Mohawk Group
 - d. Patcraft
 - e. Shaw Hard Surface
 - f. Tarkett
 - g. Toli

2. Base and Other Accessories:
 - a. Armstrong
 - b. Endura
 - c. Roppe
 - d. Johnsonite

2.2 PRODUCTS, GENERAL

- A. Colors, Textures, and Patterns: Provide tile, sheet goods and accessories in color, texture and pattern to match specified products. Colors and patterns indicated by reference to manufacturer's name and designations are for color and pattern identification only and are not intended to limit selection of other manufacturer's products with similar colors and patterns. If no colors or patterns are indicated, provide color(s) and pattern(s) as selected by Architect from manufacturer's standards.
- B. Resilient flooring and base shall comply with RFCI FloorScore Program.

2.3 RESILIENT TILE FLOORING

- A. Luxury Vinyl Tile LVT1 - 6: Luxury vinyl tile complying with ASTM F1700, Class III, Type B and as follows:
1. Basis of Design Product: Patcraft Mark Making I509V, or equal.
 2. Size: 6" x 48"
 3. Wear Layer Thickness: 20 mil
 4. Total thickness: 0.197"
 5. Finish: Exoguard+
 6. Warranty: 15 years
 7. Colors:
 - a. LVT1 (Field): Pure 00500.
 - b. LVT2: Watercolor 00400
 - c. LVT3: Succulent 00300
 - d. LVT4: Boysenberry 00900
 8. Installation: Stagger.

B. Luxury Vinyl Tile LVT7: Luxury vinyl tile complying with ASTM F1700, Class III, Type B and as follows:

1. Basis of Design Product: Interface Textured Woodgrains from Level Set Collection, or equal.
2. Size: 9.845" x 39.38" (25cm x 1m)
3. Wear Layer Thickness: 22 mil
4. Total thickness: 4.5mm
5. Finish: Ceramor
6. Warranty: 15 years.
7. Color: Grey Dune A00405
8. Installation: Ashlar.
9. Location: Makerspace

C. Homogeneous Vinyl Tile HVT1, HVT2, HVT3 and HVT4: Homogeneous vinyl tile complying with ASTM F1066, Class II, through pattern, and as follows:

1. Composition: Vinyl tile formulated from 20% - 30% PVC and binder with the color and pattern detail dispersed uniformly throughout the thickness of the product.
2. Basis of Design Product: Toli FasolPlus represented by CBC America LLC, or equal.
3. Size: 17.7" x 17.7"
4. Total thickness: 0.120"
5. Surface: Type A, smooth
6. Edges: Square
7. Warranty: 10 years.
8. Colors:
 - a. HVT1: As selected by Architect
 - b. HVT2: As selected by Architect
 - c. HVT3: As selected by Architect
9. Location: As scheduled.

D. Vinyl Composition Tile: Match existing, for patching.

2.4 RESILIENT WALL BASE

A. Rubber Wall Base: ASTM F 1861, Type TP, Group 1 (solid), 4" high, 1/8" thick, smooth surface, and as follows:

1. Style: Straight (toeless) style for all carpeted areas and cove base with toe (set-on type) elsewhere
2. Lengths: Coils in manufacturer's standard length.
3. Inside and Outside Corners: Preformed.
4. Products: Rubber Base by Johnsonite/Tarkett.
5. Colors: Four colors, as selected by Architect..

2.5 MISCELLANEOUS RESILIENT ACCESSORIES

- A. Colors: As selected by Architect from manufacturer's full range of colors produced for accessory molding complying with requirements indicated.
- B. Rubber Accessory Moldings: Provide rubber accessory molding complying with the following:
 - 1. Product Description: Carpet edge for glue-down applications, carpet nosing, reducer strip for resilient flooring, and tile and carpet joiner.
 - a. Provide rubber transition strip at resilient floor tile color changes - at doors.
 - 2. Profile and Dimensions: As indicated or required.

2.6 INSTALLATION ACCESSORIES

- A. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.
- B. Concrete Sealer: Type recommended and approved by resilient flooring manufacturer and adhesive manufacturer to ensure proper adhesion of resilient flooring to substrate.
- C. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- D. Adhesives (Cements): Products supplied by resilient flooring and accessory manufacturers, of type recommended to suit resilient products and substrate conditions.
- E. Floor Polish: Acrylic type, as recommended by flooring material manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine areas where installation of flooring will occur, with Installer present, to verify that substrates and conditions are satisfactory for flooring installation and comply with flooring manufacturer's requirements and those specified in this Section.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond tests recommended by flooring manufacturer.
 - 2. Finishes of subfloors comply with tolerances and other requirements specified in Division 03 Section "Cast-In-Place Concrete" for slabs receiving resilient flooring.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.

- C. Concrete Moisture Emission Tests: Perform calcium chloride test and moisture meter test as per manufacturer's directions, as follows, and other tests if recommended by resilient flooring and adhesive manufacturer:
 - 1. Perform moisture test at rate of one per 2,000 sq.ft. of new and existing floor area to be covered.
 - 2. Report test results in writing to Architect, and Contractor within 24 hours after tests are completed. Reports of concrete moisture emission tests shall contain the Project identification name and number, date of test location of test within structure.
 - 3. Perform additional moisture emission tests of in-place concrete when test results indicate specified moisture content has been exceeded, as directed by Architect.
 - a. Repeat test one week after initial test minimally and additionally repeat test if required by field conditions to determine moisture levels in area of resilient flooring application.
- D. Do not proceed with installation until unsatisfactory conditions have been corrected.
- E. Only if it is not possible to provide a concrete substrate with acceptable moisture levels, then a surface applied moisture mitigation system shall be used that meets the requirements of ASTM F3010 Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.

3.2 PREPARATION

- A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive flooring.
- B. Use trowelable leveling and patching compounds per flooring manufacturer's directions to fill cracks, holes, and depressions in substrates and to patch and level floors as required to provide suitable substrate for flooring application.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives by using a grinder, sander, or polishing machine with a heavy-duty wire brush.
- D. Broom or vacuum clean substrates to be covered by flooring immediately before installation of flooring. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
- E. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.
- F. Seal concrete substrates as required by moisture test results to ensure proper adhesion of resilient flooring to substrate.

3.3 TILE INSTALLATION

- A. General: Comply with tile manufacturer's installation directions and other requirements indicated that are applicable to each type of tile installation included in Project.
- B. Lay out tiles from center marks established with principal walls so tiles at opposite edges of room are of equal width. Install tiles square with room axis, unless otherwise indicated.
- C. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles in decorative patterns as indicated on Drawings.
- D. Scribe, cut, and fit tiles to butt tightly to vertical surfaces and edgings.
- E. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.
- H. Adhere tiles to flooring substrates without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.
- I. Use full spread of adhesive applied to substrate in compliance with tile manufacturer's directions including those for trowel notching, adhesive mixing, and adhesive open and working times.
- J. Hand roll tiles where required by tile manufacturer.

3.4 INSTALLATION OF WALL BASE AND ACCESSORIES

- A. General: Install resilient accessories according to manufacturer's written installation instructions.
- B. Apply resilient wall base to walls, pilasters, casework, and other permanent fixtures in rooms and areas where base is required. Install wall base in lengths as long as practicable. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
 - 1. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
 - 2. Install preformed corners as per manufacturer's directions.

- C. Place resilient accessories so they are butted to adjacent materials of type indicated and bond to substrates with adhesive. Install reducer strips at edges of flooring that otherwise would be exposed.

3.5 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing installation:
 - 1. Remove visible adhesive and other surface blemishes using cleaner recommended by manufacturers.
 - 2. Sweep or vacuum floor thoroughly.
 - 3. Do not wash floor until after time period recommended by resilient flooring manufacturer.
 - 4. Damp-mop flooring to remove black marks and soil.
- B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by flooring manufacturer.
 - 1. Apply protective floor polish to flooring surfaces that are free from soil, visible adhesive, and surface blemishes. Coordinate selection of floor polish with Owner's maintenance service requirements.
 - 2. Cover flooring with undyed, untreated building paper until inspection for Substantial Completion.
- C. Clean flooring not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean flooring using method recommended by manufacturer.
 - 1. Strip protective floor polish that was applied after completing installation prior to cleaning.
 - 2. Reapply floor polish after cleaning.

END OF SECTION 096500

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes modular carpet tile.
- B. Related Requirements:
 - 1. Division 09 Section "Resilient Flooring and Accessories" for resilient wall base and accessories installed with carpet tile.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site
 - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include installation recommendations for each type of substrate.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Type, color, and location of insets and borders.
 - 9. Type, color, and location of edge, transition, and other accessory strips.
 - 10. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.
- D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- E. Maintenance Data: For carpet tile to include in maintenance manuals specified in Division 01. Include the following:
1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.
- F. Sustainability: Provide the Statement of the Achievement Level the carpet has attained for Gold, 52 to 70 points, based on specific Sustainable Attribute Performance for all product stages according to ANSI/NSF 140.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Performance Characteristics of Carpet Tile: Provide carpet tile identical to that tested for the following performance characteristics, per test methods indicated:
 - 1. Flammability: Passes DOC FF 1-70 Pill Test.
 - 2. Flame Spread: Meets NFPA Class 1 when tested under ASTM E-648 Glue Down.
 - 3. Smoke Density: 450 or less, Flaming Mode when tested under NBS Smoke Chamber NFPA-258.
 - 4. Static: No more than 3.5 KV when tested under AATCC-134.
 - 5. Specific Optical Density: Not more than 300 in first 4 minutes tested in flaming or non-flaming mode when tested under ASTM E662.
 - 6. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648 or NFPA 253.
- C. Mockups: Before installing carpet tile, install mockups for each type of carpet tile installation required to demonstrate aesthetic effects and qualities of materials and execution. Install mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Install mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be installed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting work.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Remove mockups when directed.
 - 7. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI Carpet Installation Standard 2011.
- B. Store carpeting per manufacturer's recommendations for allowable temperature and humidity range. Products shall not be allowed to become damp.
- C. Remove carpeting from packaging and store in unoccupied, ventilated areas (100% outside air supply, minimum of 1.5 air changes per hour, no recirculation) for 24-72 hours prior to installation. Carpeting shall not be stored with materials which have high emissions of VOCs or other contaminants. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation;

gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders

1.9 FIELD CONDITIONS

- A. Comply with CRI Carpet Installation Standard 2011 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.10 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
 - 3. Warranty Period: Lifetime.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Manufacturers: Provide specified Basis of Design products or equal manufactured by one of the following manufacturers:
 - 1. Bentley
 - 2. Interface
 - 3. Mannington
 - 4. Milliken
 - 5. Mohawk Commercial Carpet
 - 6. Shaw
 - 7. Tandus Centiva

- B. Sustainable Carpet Certification: Provide carpet tile that has a NSF/ANSI 140 rating of Gold or better.
- C. Emissions: Provide carpet tile that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.
- D. Carpet Tile CPT1:
 - 1. Construction: Tufted, textured loop
 - 2. Fiber Content: Milliken-Certified WearOn Nylon Type 6,6
 - 3. Soil/Stain Protection: StainSmart
 - 4. Dye Method: PrintWorks Precision Dyeing
 - 5. Face Weight: 15 oz. per square yard.
 - 6. Machine Gage: 1/12 in.
 - 7. Pile Height: 0.13 in.
 - 8. Total Thickness: 0.28 in.
 - 9. Average Density: 6541
 - 10. Stitches per Inch: 9.8
 - 11. Primary Backing: Synthetic
 - 12. Secondary Backing: PVC-free WellBAC Comfort Cushion
 - 13. Size: 9.85 in x 39.4 in (25cm x 1m)
 - 14. Guarantees: Lifetime for wear, static, edge ravel, delamination, tuft bind, stain, backing material.
 - 15. Basis of Design Product: Milliken "Edge Lit" Style, from "Edge Lit" Collection.
 - 16. Color: EDG-229-148-232 Aurora
 - 17. Installation: As scheduled.
 - 18. Location: Library.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
 - 1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.
- D. Carpet Edge Guard: Refer to Division 09 Section "Resilient Flooring and Accessories."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer. Do not install flooring if subfloor moisture emission rate exceeds indicated amounts.
 - a. Calcium Chloride Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed the maximum moisture-vapor-emission rate acceptable to flooring manufacturer.
 - b. Moisture Meter Testing: Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have relative humidity level measurement acceptable to flooring material manufacturer.
 - c. Testing Procedures
 - 1) Where flooring is indicated to be applied to structural concrete topping or concrete slab-on-grade substrates, perform moisture meter tests.
 - 2) Where flooring is indicated to be applied to areas where hydraulic cement topping is installed, perform calcium chloride or moisture meter tests as required by topping manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI Carpet Installation Standard 2011, Section 7, "Site Conditions; All Installations," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI Carpet Installation Standard 2011, Section 18, "Modular Carpet," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders, unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI Carpet Installation Standard 2011, Section 20, "Protecting Indoor Installations."
 - 1. Restrict traffic over adhesive installations for a minimum of 48 hours to allow proper adhesive cure.
 - 2. Restrict exposure to water from cleaning or other sources for a minimum of 30 days.

3. If required to protect the finished floor covering from dirt or paint, or if additional work is to be done after the installation, cover carpeting with a non-staining building material paper.
 4. Protect the installation from rolling traffic by using sheets of hardboard or plywood in affected areas.
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint and stain systems on the following interior and exterior substrates:
 - 1. Concrete masonry units (CMU).
 - 2. Steel and iron.
 - 3. Galvanized metal.
 - 4. Gypsum board.
 - 5. 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.
- 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.
 - 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.
4. Tnemec

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, Sealers, and Undercoaters: VOC content of not more than 200 g/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 g/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: 10 colors as selected by the Architect, plus black and white.

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.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Masonry: 12 percent.
 - 2. Gypsum Board: 12 percent.
 - 3. 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 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.
- E. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- G. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- H. 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.
 - 1. 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.
- 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:
 - a. 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.
- H. Applying Green Screen Paint: Prepare surfaces in accordance with paint manufacturer's directions.
 - 1. Sand gypsum board surfaces as per instructions prior to applying primer.
 - 2. Apply green screen paint using a 3/4" nap roller cover to produce required surface texture.

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.

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 EXTERIOR PAINTING SCHEDULE

- A. General: Provide listed products or equal products of other named manufacturers in Part 2.
- B. Steel and Iron Substrates: Polyurethane, Pigmented, Epoxy Zinc Rich Primer and High-Build Epoxy Coating System: Gloss or Semi-Gloss as selected by the Architect.
 1. Prime Coat: Epoxy Zinc Rich Primer. Tnemec: Tneme-Zinc Series 90-97 or equal.
 2. Intermediate Coat: High-performance, polyamide-epoxy coating; High-Build Epoxy Marine Coating, Low Gloss: Tnemec: Hi-Build Epoxoline, Series 66, tinted slightly lighter than top coat., or equal
 3. Topcoat (Gloss)t: Aliphatic Acrylic Polyurethane, Two-Component, Pigmented, Gloss: Tnemec Endura-Shield II Series 1074.
 4. Topcoat (Semi-Gloss)t: Aliphatic Acrylic Polyurethane, Two-Component, Pigmented, Semi-Gloss: Tnemec Endura-Shield II Series 1075.
- C. Zinc-Coated (Galvanized) Metal: Full-gloss, acrylic latex enamel finish - 2 coats - self-priming.
 1. Prime Coat: Gloss acrylic latex enamel paint; MPI # 114, X-Green 114, 154, X-Green 154, 164, LEED 2009, LEED V4.
 - a. Benjamin Moore Ultra Spec D.T.M. Acrylic Gloss Enamel HP28
 2. Top Coat: Gloss acrylic latex enamel paint; MPI # 114, X-Green 114, 154, X-Green 154, 164, LEED 2009, LEED V4.

- a. Benjamin Moore Ultra Spec D.T.M. Acrylic Gloss Enamel HP28

3.7 INTERIOR PAINTING SCHEDULE

- A. General: Provide listed products or equal products of other named manufacturers in Part 2.
- B. Gypsum Board Ceilings: 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.
 - a. Benjamin Moore; Ultra Spec 500 Interior Latex Eggshell T538.
- C. Gypsum Drywall Walls: Semi-gloss, 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: Semigloss acrylic-latex, interior enamel; MPI # 43, X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS Certified.
 - a. Benjamin Moore; Ultra Spec 500 Latex Semigloss T539.
- D. Gypsum Drywall Walls at Bathrooms and Janitor's Closets (and where scheduled): 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.
 - 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.
 - a. Benjamin Moore; Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341.
- E. Gypsum Drywall Walls for Green Screen. Flat (non-glossy), fluorescent, chroma key green paint system specially designed for use in television and motion picture virtual reality production studios. One coat of primer and two coats of top coat; adjust number of coats to follow manufacturer's instructions if Basis of Design Product is not used.
 1. Primer: Pro Cyc's Grey Bonding Primer
 2. Top Coats: Two or three coats of Pro Cyc's Virtual Green® Paint.

- F. 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

- G. 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.

- H. Concrete Masonry Units (CMU) at Bathrooms and Janitor's Closets (and where
scheduled): Semi-Gloss, waterborne acrylic epoxy finish.
 - 1. Prime Coat: Acrylic block filler 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.
 - a. Benjamin Moore; Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss
V341

- I. Painted Woodwork: Semigloss, 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: Semigloss acrylic-latex, interior enamel; MPI # 43,
X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS
Certified.
 - a. Benjamin Moore; Ultra Spec 500 Latex Semigloss N539.

- J. 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.
 - a. Lenmar (Benjamin Moore); Waterborne Aqua-Plastic Urethane Satin, 1WB.1427 (335 g/L)

- K. 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

SECTION 101000 - VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of visual display boards:

1. Porcelain enamel markerboards.
2. Fabric wrapped tackboards

1.2 SUBMITTALS

A. Product Data: Provide manufacturer's product data for each type of visual display board specified.

B. Shop Drawings: For each type of visual display board required, including dimensioned elevations. Show location of joints between individual panels where unit dimensions exceed maximum panel length. Include sections of typical trim members. Show anchors, grounds, reinforcement, accessories, layout, and installation details.

C. Samples for initial selection purposes in form of manufacturer's color charts showing full range of colors available for tackboards.

D. Samples for Verification: Of the following products, showing color and texture or finish selected. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected. Prepare Samples from the same material to be used for the Work.

1. Markerboards: Actual sections of porcelain enamel finish for each type of markerboard required not less than 8-1/2 by 11 inches, mounted on the substrate indicated for the final Work. Include a panel for each type, color, and texture required.
2. Tackboards: Sample panels of actual materials to be supplied in the finished Work, not less than 8-1/2 by 11 inches (215 by 280 mm), mounted on the substrate indicated for the final Work. Include a panel for each type, color, and texture required.

E. Maintenance Data: For fabric wrapped tackboards to include in maintenance manuals specified in Division 01. Include fabric manufacturers cleaning and stain-removal recommendations.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain visual display boards through one source from a single manufacturer.

- B. Fire-Test-Response Characteristics: Provide materials with the surface-burning characteristics indicated, as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

- 1. Class A

- C. Provide GREENGUARD certified products.
- D. Fabric facing shall meet NFPA 701.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect tackboards from excessive moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation.
- B. Before installing tackboards, permit them to reach room temperature and a stabilized moisture content.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tackboards until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Verify field measurements before preparation of Shop Drawings and before fabrication to ensure proper fitting. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.6 WARRANTY

- A. General Warranty: The special porcelain enamel warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Porcelain Enamel Warranty: Furnish the manufacturer's written warranty, agreeing to replace porcelain enamel markerboards that do not retain their original writing and erasing qualities, become slick and shiny, or exhibit crazing, cracking, or flaking, provided the manufacturer's instructions with regard to handling, installation, protection, and maintenance have been followed.

- 1. Warranty Period: 50 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Porcelain Enamel Markerboards:
 - a. Claridge Products and Equipment, Inc.
 - b. Greensteel, Inc.
 - c. Lemco, Inc.
2. Tackboards:
 - a. Best-Rite Chalkboard Co.
 - b. Carolina Chalkboard Co.
 - c. Claridge Products and Equipment, Inc.
 - d. Ghent Manufacturing, Inc.
 - e. Greensteel, Inc.
 - f. Lemco, Inc.
 - g. Marsh Chalkboard Company.

2.2 MATERIALS, GENERAL

- A. Low-Emitting Materials: All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI)
- B. 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

2.3 TACKBOARDS

- A. Fabric Wrapped Frameless Tackboards: Fabric wrapped tackboard surface with fabric wrapped edges on manufacturer's standard core material, and as follows:
1. Corners: Square.
 2. Nominal Panel Thickness: Manufacturer's standard
 3. Core: Manufacturer's standard.
 4. Fabric Facing: Guliford of Maine FR701 in colors as selected by Architect.
 5. Shapes: Rectangular.
 6. Sizes: As indicated on Drawings for each location.
 7. Mounting Method: Manufacturer's standard mounting clips concealed attachment system.
 8. Basis of Design Product: Edge Wrapped Tackboards by Claridge, or equal.

2.4 MARKERBOARDS, FIXED

- A. Porcelain Enamel Markerboards: Provide balanced, high-pressure-laminated porcelain enamel boards of 3-ply construction consisting of face sheet, core material, and backing, that will accept magnetic accessories..
- B. Face Sheet: 0.024-inch (0.61-mm) enameling grade steel especially processed for temperatures used in coating porcelain on steel. Coat exposed face and edges with a 3-coat process consisting of primer, ground coat, and color cover coat. Coat concealed face with a 2-coat process consisting of primer and ground coat. Fuse cover and ground coats to steel at manufacturer's standard firing temperatures, but not less than 1200 deg F (649 deg C).
 - 1. Cover Coat (Markerboards): Provide manufacturer's standard, light-colored, special writing surface with gloss finish intended for use with erasable dry markers.
- C. Core: Core: 3/8-inch- (9.5-mm-) thick, particleboard core material complying with requirements of ANSI A208.1, Grade 1-M-1.
- D. Backing Sheet: Backing Sheet: 0.015-inch- (0.38-mm-) thick, aluminum-sheet backing.
- E. Laminating Adhesive: Provide the manufacturer's standard moisture-resistant thermoplastic-type adhesive.
- F. Markerboard Color: White.
- G. Basis of Design Product: LCS 3 Markerboard by Claridge, or equivalent.
- H. Unit Markerboards: Basis of Design is Claridge Series 3 Markerboard or equal.
 - 1. Accessories: Full length flat style marker tray and 2" map rail with two map hooks.
 - 2. Frame Style: 1-1/4" face, mitered corners, in finish as selected by Architect.
 - 3. Sizes: As indicated on Drawings for each location.

2.5 ACCESSORIES

- A. Mounting Accessories: Provide angle clip hangers and mounting adhesive supplied by manufacturer.
- B. Flag Holders: Provide a flag holder accessory on whiteboards for each classroom.

2.6 FABRICATION

- A. Assembly: Provide factory-assembled tackboards and markerboard units in single units without joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine wall surfaces, with Installer present, for compliance with requirements and other conditions affecting installation of visual display boards.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Deliver factory-built visual display boards completely assembled in one piece without joints. If dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to the Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.
- B. Install units in locations and at mounting heights as indicated on drawings; comply with manufacturer's installation instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for a complete installation.

3.3 ADJUST AND CLEAN

- A. Verify that accessories required for each unit have been properly installed
- B. Clean units in accordance with the manufacturer's instructions. Break in markerboards only as recommended by the manufacturer.

END OF SECTION 101000

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Panel signs.
2. Signage accessories

1.2 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.

B. Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.

1. Provide message list for each sign, including large-scale details of wording, lettering, and braille layout.

C. Samples for Initial Selection: For each type of sign material indicated that involves color selection.

1. Panel Signs: Samples of each finish type and color, on not less than 4-inch squares of plastic material, showing the full range of colors available

D. Samples for Verification: For each type of sign, include the following Samples to verify color selected:

1. Panel Signs: Full-size Samples of each type of sign required.
2. Approved samples will be returned for installation into Project.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by signage manufacturer.

- B. Source Limitations: Obtain each sign type through one source from a single manufacturer.
- C. Regulatory Requirements: Comply with ANSI A.117.1 - 2017 and with code provisions as adopted by authorities having jurisdiction.
 - 1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
 - a. Room Capacity.
 - b. Signs for Accessible Spaces.

1.5 COORDINATION

- A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.
 - 1. For signs supported by or anchored to permanent construction, furnish templates for installation of anchorage devices.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Manufacturers of Panel Signs:
 - a. Advance Corporation; Braille-Tac Division.
 - b. A. R. K. Ramos.
 - c. ASI-Modulex, Inc.
 - d. Crown Sign Systems.
 - e. Gemini Incorporated.
 - f. Innerface Sign Systems, Inc.
 - g. Metal Arts; Div. of L&H Mfg. Co.
 - h. Mills Manufacturing Company.
 - i. Mohawk Sign Systems.
 - j. Nelson-Harkins Industries.
 - k. Southwell Company (The).
 - l. Takeform

2.2 PANEL SIGNS

- A. General: Provide signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

1. Produce sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally.
2. Sign materials shall meet a Class A finish.

B. Interior Panel Signs: The signage shall be a direct print acrylic sign system with applied graphics including all tactile requirements in adherence to ADA specifications. Signage shall be capable of accepting direct prints including colors, patterns, graphic images and photography. Prints shall be second surface to protect from scratches, fading or other damage. Provide lettering, graphics and background materials in styles and colors as indicated on the Drawings, and below.

1. Produce smooth, even, level sign surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.58 mm) measured diagonally.
2. Lettering and Braille Content: Provide uppercase letters raised 1/32 inch (.79 mm), and grade 2 braille for each specific location. Minimum text height: 5/8 inch (15.8 mm).
 - a. Tactile lettering shall be precision machined, matte PETG and subsurface colored for scratch resistance.
 - b. Braille shall be formed by acrylic spheres inserted directly into a scratch resistant, acrylic face, pressure fit in high tolerance drilled holes.
3. Pictograms: Provide graphics raised 1/32 inch (.79 mm), with minimum 6 inch (152.4 mm) high background field, and lettering and braille written description directly below.
4. Basis of Design Products: Vivid by Takeform, or equal.
5. Sign Design: As indicated on Drawings.
6. Construction: Signage shall be fabricated of acrylic, .375" thick, comprised of two layers. Edges shall be smooth without chips, burrs, sharp edges or marks. The direct print shall be second surface to prevent scratching, fading or other damage. Acrylic shall be non-glare optically clear with a P99 finish assuring no loss of clarity or composition of the print.
7. Sign Mounting: Acrylic shim plate and mechanical fasteners.
8. Colors: As indicated on Drawings.
9. Interlayer Background Artwork: Digital file will be supplied by Architect.
10. Printed Inserts: The signage shall be capable of accepting paper inserts to allow changing and updating as required. Insert components shall have a 0.040" thickness non-glare acrylic window and shall be flush to sign face for a smooth, seamless appearance.
 - a. Provide and install all signage inserts.
 - b. Provide a template containing layout, font, color, artwork and trim lines to allow Owner to produce inserts on laser or ink jet printer. The template shall be in an Acrobat or Word format (.pdf).
11. Provide specified signage as scheduled and indicated on Drawings.

2.3 PANEL ACCESSORIES

- A. Mounting Methods: Manufacturer's standard mounting shims for walls, and two faced tape for panel signs and backing panels on glass.
 - 1. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides; 3M "VHB Heavy Duty Mounting Tape" or equal.

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 work.
- B. Verify that items, including anchor inserts, provided under other sections of Work are sized and located to accommodate signs.
- C. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Locate interior wall signs and accessories where indicated, in accordance with ANSI A.117.1 - 2017 and with code provisions as adopted by authorities having jurisdiction, using mounting methods of the type described and in compliance with the manufacturer's instructions.
 - 1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
 - 2. Mount signs on wall adjacent to the latch side of door, unless otherwise indicated. Where there is no wall space to the latch side of the door, including at double leaf doors, mount sign on the nearest adjacent wall as approved by the Architect. Mount signs at 48-inches (1219 mm) from the baseline of the lowest characters to the finished floor.
 - 3. Locate signs to allow approach within 3-inches (75 mm) of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Panel Signs and Directories: Attach signs to wall surfaces using double sided tape.
- C. Glass-Mounted Panel Signs: Provide backer panel that matches color and size of panel sign and adhere to glass surface. Mount panel signs to backer panel using self-adhesive methods.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101400

SECTION 102213 - WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Standard-duty wire mesh partitions with swinging gates.

1.2 DEFINITIONS

- A. As defined in ASTM E 2016:
 - 1. Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.
 - 2. Lock Crimp: Deep crimps at points of the intersection that lock wires securely in place

1.3 ACTION SUBMITTALS

- A. Product Data for each type of product specified, consisting of manufacturer's specification, technical data, and installation instructions.
- B. Shop Drawings showing fabrication and installation of wire mesh partitions, including plans, elevations, and large-scale details showing anchorage and accessory items. Provide location template drawings for items supported or anchored to permanent construction
 - 1. Include clearances required for operation of doors and gates.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: 12-by-12-inch (300-by-300-mm) panel constructed of specified frame members and wire mesh. Show method of finishing members at intersections.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a firm experienced in manufacturing wire mesh partitions similar to those indicated for this Project and that have a record of successful in-service performance.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual locations for wire mesh products by accurate field measurements before fabrication and show recorded measurements on Shop Drawings.

Coordinate fabrication and delivery schedules with construction progress to avoid delaying the Work.

1.6 COORDINATION

- A. Coordinate installation of anchorages for wire mesh items supported or anchored to permanent construction. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acorn Wire and Iron Works, Inc.
 - 2. G-S Company (The).
 - 3. Newark Wire Works Inc.
 - 4. SpaceGuard Products
 - 5. Wire Crafters Inc.

2.2 MATERIALS

- A. Steel Wire: ASTM A 853.
- B. Steel Channels, Angles, Plates, and Bars: ASTM A 36 (ASTM A 36M).
- C. Cold-Rolled Steel Channels: Formed from steel sheet.
- D. Square Steel Tubing: Cold-formed structural steel tubing, ASTM A 500.

2.3 STANDARD-DUTY MESH PARTITIONS

- A. Mesh: 0.135-inch- (3.4-mm-) diameter, intercrimped steel wire woven into 1-1/2-inch (38-mm) diamond mesh, or 1 by 2 inch rectangular openings securely clinched to frame members.
- B. Frames: Provide cutouts for pipes, ducts, beams, and other items shown or necessary for partition installation. Finish edges of cutouts to provide a neat, protective edge.
 - 1. Vertical Members: 1-1/4-by-5/8-by-0.1046-inch (32-by-16-by-2.7-mm) cold-rolled steel C-Section channels with 1/4-inch- (6-mm-) diameter bolt holes approximately 12 to 18 inches (450 mm) o.c.
 - 2. Horizontal Members: 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled steel channels, mortised and tenoned to vertical members.

3. Horizontal Reinforcing Members: 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled steel channels with wire woven through or two 1-by-1/2-inch (25-by-13-mm) steel channels bolted or riveted toe to toe through mesh, and secured to vertical members. Provide number of horizontal reinforcing members to suit panel height as recommended by partition manufacturer.
 - C. Vertical Stiffening Bars: For freestanding partitions 12 feet (3.66 m) in height or over, provide flat steel bar stiffener posts between abutting panel frames. Size as recommended by partition manufacturer for partition height required. Increase size of stiffening bars, if required, to maintain partition rigidity.
 - D. Top Capping Bars: 2-1/4-by-1-inch (56-by-25-mm) cold-rolled steel channels, secured to top framing channels with 1/4-inch- (6-mm-) diameter "U" bolts spaced not more than 28 inches (700 mm) o.c.
 - E. Corner Posts: 1-1/4-by-1-1/4-by-1/8-inch (32-by-32-by-3-mm) steel angles with floor shoe and 1/4-inch- (6-mm-) diameter bolt holes to align with bolt holes in vertical frame members.
 - F. Line Posts: Where partition runs exceed 20 feet (6 m) without intersecting or connecting to overhead framing, furnish 3-inch (75-mm) by 4.1-lb (1.9-kg) steel channel line posts with 5-by-18-by-1/4-inch (125-by-450-by-6-mm) steel base plates located at recommended intervals to ensure partition rigidity and stability.
 - G. Intersection Posts: Where 3- or 4-way intersections occur, use 1-1/4-by-1-1/4-inch (32-by-32-mm) tubular steel posts with floor shoe and 1/4-inch- (6-mm-) diameter bolt holes aligned for bolting to adjacent panels.
 1. For other than 90-degree intersections, use manufacturer's recommended tubular steel corner posts and installation accessories.
 - H. Floor Shoes: Cast metal, sized to suit vertical framing and to provide approximately 3 inches (75 mm) of clear space between finished floor and bottom horizontal frame members. Furnish units with set screws for leveling adjustment.
- 2.4 PARTITION DOORS
- A. Hinged Door: Door frame of 1-1/4-by-1/2-by-1/8-inch (32-by-13-by-3-mm) steel channels with 1-1/4-by-1/8-inch (32-by-3-mm) flat steel bar cover plates on 3 sides, and 1/8-inch- (3-mm-) thick angle strike bar and cover on lock side. Provide 1-1/2 pairs of 3-by-3-inch (75-by-75-mm) butt hinges riveted or welded to door and frame. Align bottom of door with bottom of adjacent panels.
 1. Cylinder Lock: Mortise type with cylinder specified in Division 08 Section "Door Hardware"; operated by key outside and recessed turn knob inside.
- 2.5 FABRICATION

- A. Do not use components less than sizes indicated. Use larger-size components as recommended by partition component manufacturer.
- B. Provide bolts, hardware, and accessories for complete installation.
- C. Finish: Provide one of the following, as selected by Architect
 - 1. Painted Finish: Manufacturer's standard primer, and shop-applied electrostatic spray enamel finish in color selected by Architect.
 - 2. Galvanized: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - a. ASTM A 123/A 123M, for galvanizing steel and iron components.
 - b. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

PART 3 - EXECUTION

3.1 PARTITION INSTALLATION

- A. Erect partitions plumb, rigid, properly aligned, and securely fastened in place, complying with Drawings and manufacturer's recommendations.
- B. Provide additional field bracing as shown or necessary for rigid, secure installation. Installer to provide additional clips and bracing as required.

3.2 ADJUSTING AND CLEANING

- A. Adjust moving components for smooth operation without binding.
- B. Touch up damaged finish after completing installation using field-applied paint to match color of shop-applied finish.

END OF SECTION 102213

SECTION 102800 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Washroom accessories.
 2. Mirrors.
 3. Adult changing stations.
 4. Installation of Owner furnished washroom accessories

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
1. Construction details and dimensions.
 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 3. Material and finish descriptions.
 4. Features that will be included for Project.
 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
1. Identify locations using room designations indicated on Contract Drawings.
 2. Identify products using designations indicated on Contract Drawings.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals, including replaceable parts and service recommendations.

1.3 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.
- B. Inserts and Anchorages: Furnish accessory manufacturer's standard inserts and anchoring devices that must be set in concrete or built into masonry. Coordinate delivery with other work to avoid delay.
- 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.

1.4 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
 - 1. Coordinate reinforcing and blocking locations in wall supporting adult changing station; coordinate electric power supply requirements and wiring requirements for adult changing station.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.5 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Fifteen (15) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Products: The design for toilet accessories is based on certain named equipment. Subject to compliance with requirements, provide the named product or an equivalent product by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Dryer, Inc.
 - 3. American Specialties, Inc.
 - 4. Bradley Corporation.
 - 5. Bobrick Washroom Equipment
 - 6. Excel Dryer Corporation.
 - 7. World Dryer Corporation

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch (0.8-mm) (22-gage) minimum nominal thickness, unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch (0.9-mm) (20-gage) minimum nominal thickness.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.
- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.3 GRAB BARS

- A. Grab Bars; Stainless Steel Type: Provide grab bars with wall thickness not less than 18 gage (1.27 mm thick), concealed mounting with snap lock covers, satin finish, 1-1/2-inch (38.1 mm) clearance between wall surface and inside face of bar, outside diameter of 1-1/4 inches (32 mm); Bobrick Series B-5806, dimensions and configurations as indicated on Contract Drawings.

2.4 MIRROR UNITS

- A. Stainless Steel Framed Mirror Units: Fabricate frame from 1/2 by 1/2 by 3/8 inch channel shapes with square corners mitered, welded, and ground smooth, from satin-finished stainless. Provide shock absorbing strips and perimeter frame and for full size of back, with galvanized steel back, concealed wall hanger and theft-proof fasteners. Bobrick B-165, or approved equivalent.

- 1. Sizes: As indicated on Drawings.

2.5 ADULT CHANGING TABLES

- A. Adult Changing Table, Adjustable Height: Adjustable height changing station shall have cut resistant single piece UHMW PE bed surface, attached to continuous 2" (50mm) square powder coated steel frame and integrated adjustable front guard. Front guard will be operable with one hand and lock in the up and down positions. Changing station shall have two integrated controls to be electronically height adjustable from 12" (300mm) - 41" (1040mm) and will have a fail-safe battery backup to prevent against unit failure during power outage. Clear indication lights give the status of the mains power connection and battery level. All moving parts shall be concealed or guarded in such way as to protect against pinch points or entrapment. The changing station shall be designed to support a load of up to 500lbs, with a changing surface that hammocks to provide optimal comfort to the occupant. Bed surface shall be cut resistant and field replaceable, with tamper resistant fasteners to connect it to the steel frame. Changing surface shall be no less than 75 1/4" (1911mm) x 31 1/2" (800mm). Changing station shall be tested to meet IK10 Rating and shall have no exposed wiring/cables. Changing station shall be designed so that it can be hosed down for cleaning and can be used in wet room environment without compromising electronics.

1. Basis of Design Product: KB3000-AHL Adjustable Height Changing Station by Koala Kare products, or equal.

2.6 OTHER WASHROOM ACCESSORIES

- A. All other washroom accessories indicated on Drawings shall be furnished by Owner. Install all Owner-furnished washroom accessories.

2.7 FABRICATION

- A. General: No names or labels are permitted on exposed faces of toilet and bath accessory units. On either interior surface not exposed to view or on back surface, provide identification of each accessory item either by a printed, waterproof label or a stamped nameplate indicating manufacturer's name and product number
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.
- D. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six (6) keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to manufacturer's written instructions for type of substrate involved.
- C. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446, and in compliance with ADA Regulations.
- D. Adult Changing Table: Mount to wall in accordance with manufacturer's directions to support patient loading capacity. Test unit for proper operation.

3.2 ADJUSTING AND CLEANING

- A. Adjust toilet accessories for unencumbered, smooth operation. Verify that mechanisms function smoothly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations after removing temporary labels and protective coatings.

END OF SECTION 102800

SECTION 105200 - FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Portable fire extinguishers.
 - 2. Fire-protection cabinets for portable fire extinguishers.
 - 3. Fire-protection accessories.

1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
 - 1. Fire Extinguishers: Include rating and classification.
 - 2. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- C. NYS Fire Code Compliance: Fabricate and label fire extinguishers to comply with New York State Fire Code.
- D. Fire Extinguishers: FM listed and labeled for type, rating, and classification specified.
- E. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. J.L. Industries, Inc.

2. Kidde: Walter Kidde, The Fire Extinguisher Co.
3. Larsen's Manufacturing Company.
4. Potter-Roemer; Div. of Smith Industries, Inc.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: Carbon steel, complying with ASTM A 366/A 366M, commercial quality, stretcher leveled, temper rolled.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304.

2.3 PORTABLE FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
- B. Multipurpose Dry-Chemical Type: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, in enameled-steel container.
 1. Available Product: MP 10, Larsen's Manufacturing Company.

2.4 FIRE-PROTECTION CABINETS

- A. Basis-of-Design Product: Occult Series Model SS 2409, as manufactured by Larsen's Manufacturing Co., or an approved equivalent product by one of the following:
 1. JL Industries, Inc.
 2. Kidde Fyrnetics.
 3. Potter Roemer; Div. of Smith Industries, Inc.
- B. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
 1. Fire-Rated Cabinets: Listed and labeled to meet requirements of ASTM E 814 for fire-resistance rating of wall where it is installed.
 - a. Construct fire-rated cabinets with double walls fabricated from 0.0478 inch (1.2 mm) thick, cold-rolled steel sheet lined with minimum 5/8 inch (16 mm) thick, fire-barrier material.
 - b. Provide factory-drilled mounting holes.
- C. Cabinet Size: Suitable for specified fire extinguisher.
- D. Cabinet Style: Trimless, with concealed hinge and closed door completely covering cabinet flange.

- E. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
 - 1. Cabinet Material: Enameled-steel sheet.
 - 2. Recessed Cabinet: Cabinet box fully recessed in walls of depth indicated; with box flange overlapping surrounding wall surface and fully concealed by door when in closed position.

- F. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.
 - 1. Door Material: Stainless steel sheet
 - 2. Door Style: Flush, solid panel.
 - 3. Door Hardware: Ensure hardware meets ADA requirements. Provide manufacturer's built-in cylinder lock system (*Larsen-Loc™*), or approved equivalent, and door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.
 - 4. Lettering: Provide factory applied lettering that reads "IN CASE OF FIRE ONLY - PULL FIRMLY ON HANDLE."

2.5 ACCESSORIES

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or baked-enamel finish. Provide brackets for extinguishers not located in cabinets.

- B. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
 - a. Location: Applied to cabinet door.
 - b. Application Process: Die cut.
 - c. Lettering Color and Style: As selected by Architect.

 - 2. Identify bracket-mounted extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to wall surface.

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- C. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.
- D. Steel Finishes: Manufacturer's standard baked-enamel paint in color selected by Architect for the interior of cabinet.
- E. Stainless Steel, No. 4 finish for door and frame.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for hose valves, hose racks, and cabinets to verify actual locations of piping connections before cabinet installation.
- B. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets are to be installed.
- C. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged units.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing fire-protection specialties.
- B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
 - 1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
 - 2. Fasten mounting brackets to structure, square and plumb.
 - 3. Fasten cabinets to structure, square and plumb.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust cabinet doors that do not swing or operate freely.
- B. Refinish or replace cabinets and doors damaged during installation.
- C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 105200

SECTION 105213 - AUTOMATED EXTERNAL DEFIBRILLATOR (AED) SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Cabinets for Automated External Defibrillator (AED) unit.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for AED specialties.

1. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain AED cabinets through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: Carbon steel, complying with ASTM A 366/A 366M, commercial quality, stretcher leveled, temper rolled.

2.2 AED CABINETS

A. Basis-of-Design Product: 1400 Series AED Cabinet as manufactured by JL Industries, Inc. or an approved equivalent product by one of the following:

1. Allied Medical Products
2. Phillips Healthcare.
3. Physio-Control
4. ZOLL Medical.

B. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.

1. Cabinet Size: Suitable for any size AED unit.
2. Cabinet Style: Exposed one-piece trim and door frame.
3. Cabinet Material: Enameled-steel sheet.

4. Semi-Recessed Cabinet: Semi-recessed cabinet partially concealed in walls, with 2-1/2" or 3" rolled edge trim overlapping wall surface.
- C. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.
1. Door Material: Enameled-steel sheet.
 2. Door Style: Full acrylic or tempered glass glazing with pull handle and AED graphics on door.
- D. Accessories: Provide the following:
1. Audible alarm 85dba, powered by 9 volt battery. Provide with on/off switch
 2. Strobe light, powered by 9 volt battery, built-in to cabinet or mounted above cabinet as required by field conditions.

2.3 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.
- D. Steel Finishes: Manufacturer's standard baked-enamel paint in color selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets are to be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing AED specialties.
- B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
 1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
 2. Fasten cabinets to structure, square and plumb.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust cabinet doors that do not swing or operate freely.
- B. Refinish or replace cabinets and doors damaged during installation.
- C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 105213

SECTION 122200 - DRAPERIES AND TRACKS

PART 1 - GENERAL.

1.1 SUMMARY

- A. This Section includes draperies and drapery tracks.

1.2 SUBMITTALS

- A. Product Data: For the following:

1. Tracks: Include maximum weights of draperies that can be supported.
2. Fabrics and textile treatments.

- B. Shop Drawings:

1. Tracks: Show installation and anchorage details and locations of controls.
2. Draperies: Show sizes, locations, and details of installation.

- C. Coordination Drawings: For track installation; reflected ceiling plans drawn to scale and coordinating track installation with openings and ceiling-mounted items. Show the following:

1. Suspended ceiling components.

- D. Samples for Initial Selection: For each type of product indicated.

- E. Samples for Verification: As follows:

1. Tracks: 18 inches (450 mm) long, with carriers, controls, and accessories.
2. Fabrics: For each color and pattern indicated, provide Sample, full width by 36 inches (1000 mm) long, from dye lot to be used for the Work and with specified textile treatments applied. Show complete pattern repeat if any. Mark top and face of fabric.
3. Drapery Fabrication Samples: For each heading, fabric, color, and pattern indicated, a complete full-size panel to verify details of fabrication and thread colors.

- F. Product Schedule: Use same designations indicated on Drawings.

- G. Product Certificates: For each fabric treated with flame retardant, signed by fabric supplier and indicating treatment durability and cleaning procedures required to maintain treatment effectiveness.

- H. Maintenance Data: For products to include in maintenance manuals.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: For draperies and tracks, fabricator of draperies.
- B. Source Limitations: For draperies, obtain each color and pattern of fabric and trim from one dye lot.
- C. Fire-Test-Response Characteristics: For fabrics treated with fire retardants, provide products that pass NFPA 701 as determined by testing of fabrics that were treated using treatment-application method intended for use for this Project by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before drapery fabrication and indicate measurements on Shop Drawings.
- B. Scheduling: Do not deliver or install draperies until after other finish work, including painting, is complete and spaces are otherwise ready for occupancy.

1.5 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. Track Carriers: For each size indicated, equal to 5 percent of amount installed.
 - 2. Fabrics: For each fabric, color, and pattern indicated, full-width lengths equal to 5 percent of amount installed

PART 2 - PRODUCTS

2.1 DRAPERY TRACKS

- A. Manually Operated Track:
 - 1. Basis of Design Product: Provide TRAK-EZE Model 224 Walk-Along Operation by Automatic Devices Company, or equal products by one of the following:
 - a. Kirsch.
 - b. Silent Gliss USA Inc.
 - c. Springs Industries, Inc..
 - 2. Track: 16 gauge extruded aluminum, entirely enclosed except for slot in the bottom, and in one continuous piece except where splicing clamps are required. Track shall be designed to mount directly to ceiling using the predrilled holes 16" o.c. in the track. Track design shall provide a 12" center overlap.
 - a. Dimensions: 1-7/8" wide x 1-1/4" high
 - b. Lengths:: As indicated on Drawings.
 - c. Configuration: Straight

- d. Support Capability: Weight of drapery indicated mounted on track length indicated.
 - e. Finish: Clear anodized.
 - f. Basis of Design Products:
 - 1) Track: No. 2200 by Automatic Devices Company, or equal.
 - 2) Track Splices: No. 2224 Splice Clamp by Automatic Devices Company, or equal.
 - 3) End Stop for Track: No. 2209W End Stop for Walk Along Systems by Automatic Devices Company, or equal. Provide one at each end of track to contain carriers in track.
3. Operation: Walk-draw.
4. Carriers: Carriers shall be of plated steel construction with two polyethylene wheels held to block by plated steel rivet. Single carriers shall be placed 6" o.c. with wheels rolling on two separate parallel treads. Master carriers shall allow curtain overlap by passing each other in a common track channel and shall be provided at each leading edge.
- a. Basis of Design Products:
 - 1) Master Carriers: No. 2202 Master Carrier by Automatic Devices Company, or equal.
 - 2) Single Carrier: No. 1701 Single Carrier by Automatic Devices Company, or equal.

2.2 DRAPERIES

- A. General: Provide fabrics inherently and permanently flame resistant or chemically flame resistant by immersion treatment to comply with requirements indicated. Provide fabrics from the same dye lot.
- B. Polyester Velour: Napped, woven fabric of 100 percent cotton weighing not less than 25 oz./linear yard, flame resistant; 54-inch width.
 - 1. Basis of Design Product: Rose Brand 25 oz. Memorable Velour, FR or equal from one of the following:
 - a. J. L. de Ball America, Inc..
 - b. KM Fabrics, Inc..
 - 2. Color: Dove VL25009.
- C. Lining: Black-out, light-tight. Black color cloth of 100 percent cotton; medium weight (.67 lbs/sq yd); 54-inch minimum width.
 - 1. Basis of Design Product: Black Ranger Cloth Lining, FR, #RANG0002 by Rose Brand, or equal from one of the following:
 - a. J. L. de Ball America, Inc..
 - b. KM Fabrics, Inc.
- D. Hem Weights: 1-inch- (25-mm-) square lead weights

2.3 DRAPERY FABRICATION

- A. Fabricate draperies in heading styles and fullnesses indicated. Fabricate headings to stand erect. If less than a full width of fabric is required to produce panel of specified fullness, use equal widths of not less than one-half width of fabric located at ends of panel.
 - 1. One-Way-Stacking Draperies: Add 5 inches to overall width for returns.
 - 2. Center-Opening Draperies: Add 10 inches to overall width for overlap
 - 3. Fullness: 100%
- B. Seams: Sew vertical seams with twin-needle sewing machine with selvage trimmed and overlocked. Join widths so that patterns match and vertical seams lay flat and straight without puckering. Horizontal seams are not acceptable.
- C. Side Hems: Double-turned, 1-1/2-inch- wide hems consisting of three layers of fabric, and blindstitched so that stitches are not visible on face of drapery.
- D. Bottom Hems: Double-turned, 4-inch- wide hems consisting of three layers of fabric, and weighted and blindstitched so that weights and stitches are not visible on face of drapery.
 - 1. Sew in square lead weights at each seam and at panel corners.
- E. Linings: Equal to widths of drapery fabric, sewn flat and joined to drapery fabric at top by inside invisible seam, and hand stitched at side hems and shadowed with 1-1/2-inch return of face fabric.
 - 1. Bottom Hem: Blind stitch to drapery fabric.

PART 3 - EXECUTION

3.1 DRAPERY TRACK INSTALLATION

- A. Install track systems according to manufacturer's written instructions, level and plumb, and at height and location in relation to adjoining openings as indicated on Drawings.
- B. Isolate metal parts of tracks and brackets from concrete, masonry, and mortar to prevent galvanic action. Use tape or another method recommended in writing by track manufacturer.

3.2 DRAPERY INSTALLATION

- A. Where draperies abut overhead construction, hang draperies so that there is no clearance between headings and overhead construction.
- B. Where draperies extend to floor, install so that bottom hems just hit finished floor.

- C. Where draperies extend to windowsill, install so that bottom hems hang below sill line by not less than 6 inches.

3.3 ADJUSTING

- A. After hanging draperies, test and adjust each track to produce unencumbered, smooth operation.
- B. Steam and dress down draperies as required to produce crease- and wrinkle-free installation.
- C. Remove and replace draperies that are stained or soiled.

END OF SECTION 122200

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes
 - 1. Manual operation light filtering shades.
 - 2. Manual operation black-out shades.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
- B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other Work, operational clearances, and relationship to adjoining work.
- C. Samples for Verification:
 - 1. Shade Material: Not less than 12-inch- (300-mm-) square section of fabric for each type, from dye lot used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of material.
- D. Window Treatment Schedule: Include roller shades in schedule using same room designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining roller shades and finishes.
 - 2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
 - 3. Operating hardware.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed installation of roller shades 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
- B. Source Limitations: Obtain roller shades through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Resistance Ratings: Passes NFPA 701.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1. Build mockups of in-place full-size window shade unit in the location as directed by Architect.
2. Provide one mock-up for each type of window shade fabric provided in the Work.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range.

1.7 WARRANTY

A. Roller Shade Hardware, and Shadecloth: Manufacturer's standard non-depreciating twenty-five year limited warranty.

PART 2 - PRODUCTS MANUFACTURERS

A. Basis of Design Manufacturer: Provide specified shade systems by MechoShade System, Inc. or equivalent by one of the following:

1. Draper Shade & Screen Co., Inc.
2. Hunter Douglas Window Fashions.
3. Levolor Contract; a Newell Company; Joanna

4. Silent Gliss USA, Inc

2.2 BASIS OF DESIGN PRODUCTS

- A. Manual Single-Roll Shades: Provide Classic Mecho/5 Manual System by MechoShade or equal.

2.3 MATERIALS

- A. Room Darkening Fabric, Opaque Type: 73% vinyl coating and 27% fiberglass, 12.50 oz/yd² fabric weight, "Classic Blackout" 0700 series by MechoShade, or equal.

1. Color: 0702 Light Grey.
2. Location: Exterior windows in new Security Office Room 0-11

- B. Glare Control Fabric 1% Open Mesh Type: Reversible solar fabric with a broken twill weave pattern woven from pigmented yarns. This fabric is made of 100% flame-retardant PVC-free polyester with mesh weight 8.88 oz/sq yd, fabric thickness 0.020"; "EcoSheer (formerly EcoVeil Sheer) 6850" Series by MechoShade, or equal.

1. Color: 6858 Titanium.
2. Location: Exterior windows in the Alternate work where new windows are being provided.

- C. Brackets: Plated steel, with adequate projection to clear all window fixtures

- D. Aluminum Extrusions: Alloy and temper recommended by manufacturer for use intended and as required for proper application of finish indicated but not less than the strength and durability properties specified in ASTM B 221 for 6063-T5.

2.4 FABRICATION

- A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade

- B. Components: Noncorrosive, self-lubricating materials.

- C. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets; with manufacturer's standard method for attaching shade material.

- D. Direction of Roll: Regular, from back of roller.

- E. Mounting Brackets:

1. Single Roll Shades: Galvanized or zinc-plated steel, style for between jamb mounting unless otherwise indicated.
- F. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators; length as required for between the jambs mounting; removable design for access
- G. Bottom Bar: Steel or extruded aluminum, with plastic or metal capped ends. Provide concealed, by pocket of shade material, internal-type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.
- H. Light-Blocking Shade Hardware: Designed for eliminating all visible light gaps when shades are fully closed; manufacturer's standard side channels and perimeter seals, including sill light seal attached to bottom bar, for eliminating light gaps when shades are closed.
- I. Manual Shade Operation: Oil-impregnated integrated steel brake, clutch and sprocket assembly with continuous loop stainless steel beaded ball chain operator.
1. Bead Chain Material: #10 stainless steel chain with 120 lb. breaking strength.
 2. Operator Location: On left or right side of shade as directed by Architect for each location.
- J. Shade Units: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4 inch (6 mm) from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
 2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- K. Installation Fasteners: Fabricated from metal that is noncorrosive to shade hardware and adjoining construction and to support shades as required by manufacturer's written instructions.
- L. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
- M. Colors of Metal and Plastic Components Exposed to View: As selected by Architect from manufacturer's full range unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow clearances for window operation hardware.
- B. Install metal parts isolated from concrete or mortar to prevent corrosion.
- C. Install mounting brackets with not less than 2 fasteners per bracket.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

SECTION 123559 - INSTITUTIONAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Classroom storage furniture.
- B. Related Sections include the following:
 - 1. Division 06 Section "Interior Architectural Woodwork" for custom wood and laminate clad casework and plastic laminate countertops.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for institutional casework. Include plans, elevations, sections, details, and attachments to other Work.
- C. Samples for Verification: 6-inch- (150-mm-) square samples for each type of finish

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative of institutional casework manufacturer for installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain institutional casework, including cabinets and tops, through one source from a single manufacturer.
- C. Product Designations: Drawings indicate sizes, configurations, and finish material of institutional casework by referencing designated manufacturer's catalog numbers. Other manufacturers' casework of similar sizes and door and drawer configurations, of same finish material, and complying with the Specifications may be considered. Refer to Division 01 Section "Product Requirements."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver institutional casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Project Conditions" Article.

- B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install institutional casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where institutional casework is indicated to fit to other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating institutional casework without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION

- A. Coordinate layout and installation of metal framing and reinforcements in gypsum board assemblies for support of institutional casework.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of institutional casework that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Delamination of components or other failures of glue bond.
 - 2. Warping of components.
 - 3. Failure of operating hardware.
 - 4. Deterioration of finishes.
- B. Warranty Period: Lifetime from date of Substantial Completion

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: The design for institutional casework is based on the products of Diversified Spaces. Subject to compliance with requirements, provide the named products or a comparable product by one of the following:
 - 1. Marco Group
 - 2. Stevens Industries

2.2 MATERIALS

A. General:

1. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
2. Hardwood Plywood: HPVA HP-1, either veneer core or particle core, unless otherwise indicated.
3. Softwood Plywood: DOC PS 1.
4. Particleboard: ANSI A208.1, Grade M-3i; Minimum 43 lb. density, 3-ply construction.
5. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
6. Hardboard: AHA A135.5, S2S finish.

B. Exposed Cabinet Materials: Maple veneer.

C. Core Materials: Particleboard.

D. Hardware: Manufacturer's standards..

2.3 CLASSROOMS STORAGE UNITS FABRICATION

A. General: Caswork shall be constructed of solid maple and maple veneers. Finish shall be chemical resistant, UV finish with rubber base molding. Casework shall be SEFA compliant and MAS Certified and have a lifetime warranty.

B. Casework Type A: Not used.

C. Casework Type B: Tall locking Maple wardrobe cabinet with one maple door, one fixed and three adjustable shelves on the left side of the cabinet and a clothing rod on the right side. The top has one fixed shelf spanning the unit

1. Cabinet size: 30"W x 22"D x 84"H
2. Basis of Design Product: Access Wardrobe Cabinet Item WSC-26 by Diversified Spaces or equal.
3. Quantity: One required at Library.

D. Casework Type C: Locking tall cabinet with two maple doors and a three-point locking system: The unit has six 3/4" thick shelves (four adjustable, two fixed) with a weight limit of 40 lbs. per shelf.

1. Cabinet Size: 30"W x 22"D x 84"H
2. Basis of Design Product: Tall Storage with doors Item #GSC-23 by Diversified Spaces, or equal.
3. Quantity: Two required at Library.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of institutional casework.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CASEWORK INSTALLATION

- A. Install plumb, level, and true; shim as required, using concealed shims. Where institutional casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- B. Cabinets: Set cabinets straight, level, and plumb. Adjust tops within 1/16 inch (1.5 mm) of a single plane. Fasten cabinets to partition framing, wood blocking, or reinforcements in partitions with fasteners spaced 24 inches (600 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch (1.5 mm).

3.3 CLEANING AND PROTECTING

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 123559

SECTION 124813 - ENTRANCE FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Surface-mounted berber carpet tile mats (WOM).

1.2 SUBMITTALS

- A. Product data for each type of floor mat and frame specified, including manufacturer's specifications and installation instructions, details of construction relative to materials, dimensions of individual components, profiles, and finishes..
- B. Shop drawings showing layout and types of floor mat, full-scale sections of typical installations, details of patterns or designs, anchors, and accessories.
- C. Samples for Architect's initial selection of manufacturer's full line of available colors.
- D. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor mats.

1.3 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain each type of floor mats from one source of a single manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Construction Specialties, Inc.
 - 2. Mats Inc.
 - 3. Reese Enterprises, Inc.
 - 4. Pawling Corp.

2.2 MATS

- A. Carpet-Type Tile Mats (WOM): Non-woven needle punched polypropylene carpet bonded to non-skid rubber tile backing to form tiles 1/2 inch thick with nonraveling edges.

1. Pile Weight: 52 oz/sq yd
2. Flammability: passes DOC FF-1-70
3. Pattern: Nubby Hobnail
4. Colors, Textures, and Patterns: 71 Slate Gray.
5. Tile Size: 19-11/16" x 19-11/16"
6. Edging: BSF-225 beveled vinyl nosing edging on all 4 sides
7. Basis of Design Product: "EM-22 Berber Carpet Tiles" by Pawling Corp., or equal

2.3 ACCESSORIES

- A. Installation Adhesive: Type provided by carpet tile manufacturer, meeting local VOC requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and floor recesses for compliance with requirements for location, size, and minimum recess depth affecting installation of foot mats and frames.
- B. Proceed with installation only after unsatisfactory conditions have been corrected

3.2 INSTALLATION

- A. Adhere tiles to comply with manufacturer's instructions at locations indicated.

3.3 PROTECTION

- A. Defer installation of floor mats until time of Substantial Completion for Project.

END OF SECTION 124813

SECTION 144200 - WHEELCHAIR LIFTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes lift assemblies of the following type and application:

1. Type: Portable wheelchair lift.

1.2 DEFINITIONS

- A. Lift assembly is defined to include driving machines, platforms, access panels, guide rails, drive system, buffers (if any), signals, control systems, electrical wiring, and devices necessary to provide specified or Code-required performance operations, safety, or security of complete lift assembly. Include self-supporting lift structure as indicated.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's complete technical product data and installation instructions for each item specified, indicating capacities, dimensions, performances, operations, safety features, controls, finishes, and similar information.
- B. Shop Drawings: Plans, elevations, and details showing interfaces with other work including loading on structure, together with indication of required clearances.
- C. Maintenance Manuals: Bound manuals, with operating and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information.
- D. Inspection and Acceptance Certificates: Include operating permits as required by governing authorities for normal, unrestricted use of lifts.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The manufacturer shall have not less than 10 years experience in the design and fabrication of vertical wheelchair lifts.
- B. Installer Qualifications: Either the lift manufacturer or an installer approved by the manufacturer.
- C. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.
- D. Regulatory Requirements: Comply with ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts."

- E. Design Concept: The drawings indicate the size, configurations, and dimensional requirements of the vertical wheelchair lifts required and are based on the specific type and model indicated. Wheelchair lifts by other manufacturers may be considered provided deviations in dimensions and configurations of components are minor and do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1.5 INSTRUCTION AND MAINTENANCE

- A. Instruct Owner's personnel in proper operation and maintenance of lift. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions.
- B. Maintenance: Starting at date of Substantial Completion, provide full maintenance of units for a period of 12 months on a quarterly site visit/preventive maintenance basis. Correct operational imperfections and restore or replace defective or deteriorated components and finishes. Use only genuine parts, components, and supplies as used in the manufacture and installation of original equipment.

1.6 WARRANTY

- A. Warranty: Provide special project warranty, signed by Contractor, Installer and Manufacturer, agreeing to replace/repair/restore defective materials and workmanship of wheel chair lift during warranty period. "Defective" is hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and unsatisfactory conditions.
 - 1. The warranty period is 2 years starting on date of substantial completion.
- B. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide Basis of Design Products by Acension, a division of AGM Container Controls, Inc., or approved equal by one of the following:
 - 1. American Stair-Glide Corporation.
 - 2. The Cheney Company, Inc.
 - 3. National Wheel-O-Vator Co, Inc.
 - 4. Garaventa

2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36 (ASTM A 36M).
- B. Steel Tubing: Either cold- or hot-formed steel tubing.
 - 1. Cold-Formed Steel Tubing: ASTM A 500.
 - 2. Hot-Formed Steel Tubing: ASTM A 501.
- C. Steel Pipe: ASTM A 53; standard weight (Schedule 40), unless otherwise indicated or required by structural loads.
- D. Carbon-Steel Sheet: Either cold- or hot-rolled, commercial-quality carbon steel.
 - 1. Cold Rolled: ASTM A 366 (ASTM A 366M).
 - 2. Hot Rolled: ASTM A 569 (ASTM A 569M).
- E. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 (ASTM A 653M, Z275) coating designation, commercial quality.
- F. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing structural members, guide rails, machines, and other lift components where installation of devices is specified in another Specification Section.
- G. Expansion Anchors: Anchor-bolt-and-sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 10 times the load imposed as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
- H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

2.3 PORTABLE PLATFORM WHEELCHAIR LIFTS

- A. Basis of Design Product: Protégé 5442P by Ascension, or approved equal.
- B. Systems and Machinery: Provide lift system to comply with the following requirements:
 - 1. Rated Capacity: 900 pounds.
 - 2. Rated Speed: 5 ft. per minute.
 - 3. Power Supply: 120 VAC, 15 Amp, 1 phase, 60 Hertz.
 - 4. Power Cord: 20 ft. long with 3 prong grounded plug, GFCI and lockable disconnect switch
 - 5. System Control Voltage: 24 VAC.
 - 6. Drive Mechanism: Direct-plunger hydraulic
 - 7. Platform: Minimum 12 gauge steel, with skid-resistant surface finish.

8. Platform Size: 36" x 54".
9. Platform Configuration: Straight through, with front and rear openings.
10. Platform Side Panels: Full height solid infill panels fabricated of not less than 16 gauge galvanized steel.
11. Door/Gate: 36" wide door with power door/gate operator and interlock.
12. Grab Rail: Provide a grab rail on the platform in accordance with ANSI requirements for commercial applications.
13. Wheels: Removable casters, 5" diameter.
14. Vertical Rise: 42 inches maximum lifting height.

C. Control System: Provide constant pressure up-down switch which is keylocked and meets the requirements of ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts."

1. Provide solid-state control system to greatest extent of availability, supplemented with electromechanical equipment.
2. Electrical Interlocks: Provide unit with interlocks at all gates and doors (top, platform, and bottom) which will prevent operation of the lift unless gates/doors are secured.
3. Leveling Tolerance: Provide terminal stopping system at each extreme of travel and adjust to maintain level tolerance within 1/8 inch regardless of load size or direction of travel.
4. Limit Switches: Provide at both top and bottom extremes of travel.
5. Obstruction Sensors: Provide sensors to cut power and stop unit in the event of contact with foreign object within pathway of travel. Comply with Code.
6. Safety Device: Provide safety device to stop platform in event of overspeed condition or of breakage or slackening of suspension of support means.
7. Manual Lowering: Provide means and tool to manually lower platform in case of malfunction or power loss.

D. Station and Platform Controls:

1. Lower Landing Call Station: Push button wall mount with key operation and automatic controls.
2. Upper Landing Call Station: Push button wall mount with key operation and automatic controls.
3. Emergency Telephone: Platform shall be equipped with ADA compliant integrated telephone with a stainless-steel faceplate. Telephone shall operate in the event of power failure. A telephone line shall be supplied to the lift site as specified under Division 26

E. Ramps: Provide a stationary ramp of 16 gauge galvanized steel sheet with a slip resistant finish at lower landing for access onto the platform.

2.4 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to application and designations of finishes.

- B. Steel and Iron Finishes: Prepare and finish iron and steel, including galvanized steel, as follows:
 - 1. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6, "Commercial Blast Cleaning," followed by a conversion coating of type suited to organic coating applied over it.
 - 2. Prepare galvanized steel surfaces by removing dirt, grease, and other contaminants followed by a conversion coating of type suited to organic coating applied over it. Clean welds, mechanical connections, and abraded areas; and apply galvanizing repair paint to comply with ASTM A 780.
 - 3. Powder-Coated Finish: Immediately after cleaning and pretreating, apply manufacturer's standard, polyester, powder coating complying with AAMA 605.2.
 - a. Color and Gloss: As selected by the Architect.

PART 3 - - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's instructions and recommendations and approved shop drawings for work during installation.
- B. Code Compliance: The wheelchair lift installations shall conform to all applicable regulatory requirements including ASME A17.1 and ASME A18.1
- C. Alignment: Coordinate runway doors with platform travel and positioning, for accurate alignment and minimum clearance between platform, runway door, sills, and door frame at each landing.
- D. Adjust stops for accurate leveling at each landing, within specified tolerances.
- E. Lubricate operating parts of lift, including drive mechanism, guide rails, safety devices, and hardware.

3.2 FIELD QUALITY CONTROL

- A. Test operate lift continuously between lowest and highest landings served, lifting full rated capacity load for a minimum period of 30 minutes. Readjust stops and other devices and signal equipment for accurate landings and operation of system after completion of test.
- B. Perform tests in compliance with ASME A17.1 or A18.1 and as required by authorities having jurisdiction.
- C. Perform tests with Architect, Owner, and Contractor present.

3.3 DEMONSTRATION

- A. Instruct Owner's maintenance personnel in the proper use, operation, and maintenance of lifts. Review emergency provisions, including access and procedures to be followed

in checking for sources of operational failures or malfunctions. Confer with Owner on requirements for a complete maintenance program.

- B. Check each lift operation with Owner's maintenance personnel present before time of Substantial Completion. Determine that control system, operating components, and safety devices are functioning properly.

END OF SECTION 144200

SECTION 220100 - GENERAL CONDITIONS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 GENERAL CONDITIONS

- A. Before submitting a proposal, Bidders shall examine all Drawings related to this work and shall become fully informed as to the extent and character of the work required and its relation to the other work in the building.
- B. Before commencing work, the Contractor will examine all conditions of the project upon which his work is in any way dependent for perfect workmanship according to the intent of this Specification. No "waiver of responsibility" for incomplete, inadequate or defective adjoining work will be considered unless notice has been filed by this Contractor and acceded to by the Owner's representative in writing before the Contractor begins any part of the work.
- C. The Contractor will pay for all licenses, permits and inspection fees required by civil authorities having jurisdiction. Comply with all laws, ordinances, regulations, fire underwriters requirements applicable to work herein specified without additional expense to the Owner. (Also, local building code requirements.).
- D. It is specifically intended that anything (whether material or labor) which is usually furnished as a part of such equipment as is hereinafter called for (and which is necessary for the completion and proper operation) shall be furnished as part of this Contract without additional cost the Owner, whether or not shown in detail on the Drawings or described in the Specifications.
- E. When Drawings and Specifications conflict or there is a question as to the proper intent of this Contract, the Contractor shall assume the more expensive method in his pricing. All questions shall be directed to the Architect/Engineer in writing only and only up to ten (10) days prior to bidding.
- F. The Drawings indicate the general runs of the piping, ductwork, etc. systems and the location of equipment and apparatus, but it shall be understood that the right is reserved by the Architect/Engineer to change the location of piping work, ductwork, equipment and apparatus to a reasonable extent as building conditions may dictate, prior to their installation without extra cost to the Owner.
- G. Small scale drilling through walls and floors which may contain asbestos shall be performed by a person with a "restricted asbestos handler allied trades certificate" and shall have a copy of it in his possession at all times while working on the project.

- H. Any changes from the Drawings and Specifications and any interpretation thereof shall have the prior approval of the Architect/Engineer. The Contractor shall submit in writing, at the time of signing the Contract, any items of necessary labor and materials, which, in his opinion, are lacking in requirements of the Drawings and Specifications to insure a complete job in all respects. No consideration will be granted to alleged misunderstanding of materials to be furnished, work to be done, or conditions to be complied with, it being understood that the tender of a proposal carries with it the agreement to all items and conditions referred to herein or indicated on the accompanying Drawings.

END OF SECTION 220100

SECTION 220125 - SCOPE OF WORK

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 SCOPE OF WORK

- A. The work under this section includes all labor, materials, equipment, tools, transportation, cutting and patching, excavation and backfill and the performance of all work necessary and required for the furnishing and installation complete of all Plumbing and Drainage work as shown on Contract Drawings, as specified herein and as otherwise required by job conditions or reasonably implied, including but not necessarily limited to the following:
1. Provide complete new and altered sanitary, storm, and vent piping from all new plumbing fixtures connecting to existing sanitary and vent system. See front end spec for bedding requirements.
 2. Provide complete new and altered hot and cold water piping to all new plumbing fixtures, equipment, etc. as indicated.
 3. Provide transformer and wire to auto-faucets and flush valves for complete installation. Connect to Junction box by Electrical Contractor. Select proper transformer based on number of fixtures. All low voltage wiring by Plumbing Contractor. Furnish access door of proper size for GC to install. Coordinate with Electrical Contractor and General Contractor.
 4. Provide all new plumbing fixtures where indicated, complete including traps, stops, drains, strainers, tailpieces, faucets, escutcheons, etc.
 5. Provide complete new piping and final connections to equipment furnished under other Divisions.
 6. Provide all demolition, removal disconnecting, capping, sealing of all existing plumbing piping, apparatus, equipment, fixtures, specialties, accessories, etc. which are not included or incorporated in the new layout.
 7. Provide all required temporary connections to maintain all plumbing services without interruption.
 8. Pipe insulation.
 9. Tests and adjustments.
 10. This Contractor shall obtain all permits, bonds, approvals, etc. at no additional cost to the Owner.
 11. This Contractor shall provide shop drawings for all plumbing fixtures, piping, valves, insulation, equipment, etc.

12. Furnish minimum 18" x 18" access doors for all valves, cleanouts, etc. in all inaccessible walls, ceilings, etc. Installation by General Contractor.
13. Cutting and Patching: See Front End Specifications for Trade Responsibilities.
14. Excavation and Backfill: See Front End Specifications for Trade Responsibilities.
15. Fire stopping per FM/UL and NFPA. Refer to Division 1.

- B. Coordination Drawings (if applicable): Attention is directed to Division 1 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".

1.2 ALTERATION WORK

- A. All equipment, piping, plumbing, fixtures, etc. to be removed, shall be disposed of or salvaged as directed by the Owner. They shall not be removed from the premises without Owners approval.
- B. All piping to be removed shall be properly plugged or capped so that upon completion of all new work, all abandoned piping shall be concealed in finished areas.
- C. No dead ends shall be left on any piping upon completion of job.
- D. The existing systems shall be left in perfect working order upon completion of all new work.
- E. Location and sizes of existing piping are approximate. Exact sizes and locations of all existing piping shall be verified on the job.
- F. All removals shall be removed from the site.

END OF SECTION 220125

SECTION 220130 - WATER SUPPLY SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

- A. Furnish and install a complete cold-water distribution system to supply water to all new fixtures, water consuming equipment, and valved outlets for the use of other trades and connect to existing piping.
- B. The water supply system shall be complete with all pipe, fittings, valves, mains, risers, branches, shock absorbers, air chambers, hangers, anchors, expansion loops, connections to existing piping, covering, tests, etc. all as shown on the Drawings, as hereinafter specified.
- C. Furnish and install a complete hot water distribution system to supply water to all new fixtures and equipment requiring heated water.

PART 2 - PRODUCTS

2.1 PIPING, FITTINGS AND MATERIALS

- A. All components of water supply system shall conform to all "No Lead" requirements including NSF/ANSI-372.
- B. The domestic water systems shall be of the following material and shall be in accordance with the latest ASTM and ASME Standards.
- C. Domestic water piping within the buildings shall be seamless drawn or extruded tubing type "L" copper. Both shall be of Chase, Anaconda, Revere, and approved equal, hard temper ASTM B88 with solder joint sweat end fittings. Fittings for use with copper tubing shall be cast brass of Muellers "Streamlin" pattern or approved equal.
- D. Joints for copper tubing shall be made with 95-5 (lead and antimony free) solder. Flanges where required shall be cast brass. Provide dielectric adapters between ferrous and non-ferrous pipe joints.

2.2 VALVES

- A. All shut-off valves 2" and smaller shall be ball valves equal to Apollo 70 Series or Milwaukee BA100 Series Valve. Bronze body with chrome plated trim
- B. This Contractor shall furnish all valves as indicated on the Drawings, or as may be required for the proper control of the pipe lines installed under this Specification, so that any fixture, line or piece of apparatus may be cut out for repair without interference or interruption of the service to the rest of the Facility.

- C. All domestic water valves shall have a minimum working pressure of 125 psig, steam rated unless otherwise noted on the Drawings or specified herein. All valves shall be of one manufacture as manufactured by Milwaukee Valve or Hammond.
- D. All gate valves within the buildings shall be wedge gauge valves with painted iron wheel handles, shall have gland followers in stuffing boxes, and shall be so constructed that they may be repacked while open and under pressure. All valves shall have the name of the manufacturer and working pressure cast or stamped thereon.
- E. All gate valves shall be all bronze with sweat or screwed joint ends as required by the piping system in which they are installed.
- F. Globe valves shall be of all bronze with composition disc, threaded or sweat joint ends as required by piping system in which they are installed.
- G. Check valves shall be all bronze swing check type with threaded or sweat joint ends. Check valves 4 inch and larger shall be iron body bronze mountings and shall be provided with screwed or flanged joint ends as required by piping system in which they are installed.
- H. Drain valves, at risers and at low points, shall be 3/4 inch heavy cast brass with composition washers with male thread for hose connections.

2.3 SHOCK ABSORBERS

- A. Shock absorbers shall be similar and equal to J.R. Smith 5000 series or Zurn Z1700 series with stainless steel pressurized shell sized in accordance with P.D.I. Bulletin WH-201.
- B. Provide shock absorbers on all fixtures and equipment having quick closing valves whether or not indicated on the Drawings.
- C. Provide access doors where shock absorbers are concealed.

2.4 VACUUM BREAKERS

- A. Provide vacuum breakers on water supply piping to each fixture and equipment with submerged inlets, and on faucets and outlets, within the facility to which hose can be, or is attached forming a submerged inlet.
- B. Set vacuum breakers in exposed readily accessible locations at least four inches above floor rim level of fixture, or high point of equipment.
- C. Vacuum breakers shall be chrome-plated brass. "Watts" or other approved.
- D. Vacuum breakers under constant pressure shall be of the continuous pressure type No. 9 "Watts" or Wilkins BFP-8CH or approved equal.

2.5 EXPANSION JOINTS, ANCHORS AND GUIDES

- A. The entire piping installation shall be installed with adequate provision for expansion. No rigid connections will be permitted. Refer to Drawings for locations of expansion joints and related guides and anchors. The joints, guides and anchors shall be as manufactured by Flexonics Products, Metraflex or Flex-weld.
- B. Branches shall be of sufficient length and have three elbow swings to allow for pipe expansion.
- C. Any breaks in the piping within the guarantee period due to improper provision for expansion must be replaced at the expense of this Contractor, and the conditions corrected to prevent future recurrence.
- D. Any damages to surrounding areas and equipment due to this failure shall also be repaired and paid for at the expense of this Contractor.
- E. Joints to have 150 psi rating, ANSI-B16.5 with liner and cover.

2.6 STERILIZATION

- A. The entire domestic water piping system shall be thoroughly sterilized with chlorine before acceptance for domestic operation.
- B. The amount of chlorine applied shall be such as to provide a dosage of not less than 50 parts per million for 24 hours or 200 p.p.m. for one hour. The chlorinating material shall be either liquid chlorine or sodium hypochlorite solution and shall be introduced into the system and drawn to all points of the system. If possible to do so, the lines shall be thoroughly flushed before introduction of the chlorinating material. After a contact period of not less than 24 hours, the system shall be flushed with clean water until the residual content is not greater than 0.2 parts per million. All valves in the lines being sterilized shall be opened and closed several times during the contact period.
- C. Sterilization and tests for purity of water in the entire piping system shall be performed by the Contractor through an approved independent testing laboratory and a certificate shall be furnished to the Architect certifying the quality of purity.
- D. Per ANSI/AWWA Standard C651-05.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. It is the intent that each part of the plumbing system shall be complete in all details and water lines provided with all control valves as indicated on Drawings, or as may be required for the proper control of the pipe lines under this Specification so that any fixture, line or piece of apparatus may be cut out for repair without interference or interruption of the service to the rest of the facility.

- B. This Contractor shall examine carefully the Architectural Drawings in detail and familiarize himself with all conditions relative to the installation of piping, particularly where same is concealed behind furring or in hung ceilings.
- C. In no case shall this Contractor permit his pipes to be exposed beyond finished walls or ceilings unless specifically shown on Drawings. He shall consult with the Contractors of other trades in the building and install his piping in such a way as to least interfere with the installation of other trades.
- D. The water piping shall all be installed so as to drain to a valve provided by this Contractor and branches shall not be trapped but shall have continuous pitch. Where necessary to raise or lower mains, the same shall be provided with a drip and shall be properly valved.
- E. Piping shall be installed, whether indicated or not, so as to rise and/or drop to clear any and all conduits, lighting fixtures, ductwork and heating mains to maintain the desired clear heights. This Contractor shall consult with the Contractors of other trades and facilitate the erection of the equipment and piping.
- F. Run piping straight and as direct as possible, in general forming right angles with or parallel to walls or other piping. Risers shall be erected plumb and true.
- G. After cutting, all pipes shall be reamed out to full bore and before erection the inside of all pipes shall be thoroughly cleaned.
- H. No piping or work shall be concealed or covered until all required tests have been satisfactorily completed and work has been approved by the Architect.
- I. All materials shall be new and installed in a first class manner.
- J. In erecting pipe, friction wrenches and vises shall be used exclusively, and any pipe cut, dented or otherwise damaged shall be replaced by this Contractor.
- K. All ferrous to non-ferrous pipe connections shall be made with approved dielectric pipe or flange unions isolating joints to prevent any electrolytic action between dissimilar materials.
- L. Any piece of pipe 6 inches in length or less shall be considered a nipple. All nipples with unthreaded portion 1-1/2 inch and less shall be of weight corresponding to fitting connected. Only shoulder nipples shall be used, close nipples will not be accepted.
- M. Revised water service shall be in accordance with the local water supply department requirements. All water lines are to be protected from freezing. Install new piping for water service below frost line and provide concrete separations when crossing other utilities. Provide concrete thrust mass at changes of pipe direction conforming to authorities having jurisdiction.

END OF SECTION 220130

SECTION 220160 - SANITARY AND STORM DRAINAGE SYSTEMS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

- A. The work under this section includes all labor, materials, equipment and appliances necessary and required to completely install all drainage systems as required by the Drawings; code and as specified herein, including but not limited to the following:
 - 1. Complete sanitary drainage and venting systems including connections to the existing sanitary drainage and venting systems.
 - 2. Piping and final connections for equipment furnished under other Divisions.
 - 3. Alterations and removals to existing sanitary and vent systems.
 - 4. Tests.

PART 2 - PRODUCTS

2.1 PIPING AND FITTING MATERIALS

- A. All indoor underground storm soil, waste and vent piping shall be service weight cast iron with fittings of bell and spigot type. All exterior underground storm soil and waste piping shall be extra heavy cast iron. Each length shall have the size, weight per foot and the manufacturer's name clearly cast or stamped thereon. Fittings and traps shall be similarly marked and of corresponding weights.
- B. All aboveground storm, soil, waste and vent piping and fittings 3" and larger shall be service weight and fittings of bell and spigot type as specified in paragraph above. Above ground waste and vent piping 2" and smaller shall be galvanized steel, fittings on waste piping shall be galvanized cast iron, recessed drainage pattern, fitting on vent piping shall be galvanized cast iron, beaded pattern, screwed joints shall be made up to be perfectly tight without the use of lead or filler of any kind, except oil or graphite. Nipples for galvanized pipe shall be shoulder type. No close nipples shall be permitted.
- C. Joints shall be made with compression gaskets conforming the International Plumbing Code (IPC 705.4.2. See 2.1, E. for aboveground joint options where permitted.
- D. All galvanized pipe and fittings shall be galvanized with prime western spelter by hot drip process.
- E. The Contractor has the option of using the following types of joints with hubless cast iron pipe only if approved by the governing agencies. These joints shall be used throughout the project. No mixing of joints shall be permitted.

1. Neoprene gasketed joints similar to Ty-Seal (for above and underground application).
2. Hubless cast iron pipe with neoprene gaskets and stainless steel clamps (by Clamp-All or equal) above ground only. All in accordance with Cast Iron Soil and Pipe Institute Standard 301 latest edition. Hangers and supports shall be in accordance with manufacturer's recommendations.
3. Copper DWV system with 50-50 tin antimony solder, DWV with solvent welded or screwed joints meeting CS-270-65.

2.2 CLEANOUTS

- A. Provide easily accessible cleanouts where indicated at base of vertical stacks at ends of horizontal drainage lines and at intervals not exceeding 50 ft.; at each change of direction; on handholes of running traps, and where necessary to make entire drainage system accessible for rodding. Provide at least 18" clearance to permit access to cleanout plugs.
- B. Cleanouts for cast iron pipe shall consist of tarpped extra heavy cast iron ferrule caulked into cast iron fittings and extra heavy brass tapered screw plug with solid hexagonal unit. Cleanouts for wrought iron pipe shall consist of extra heavy brass screw plug in drainage fitting.
- C. Cleanouts turning out through walls and up through floors shall be made by long sweep ells or "Y" and 1/8 bends with plugs and face or deck plates to conform to Architectural finish in the room. Where no definite finish is indicated on the Architectural and/or Mechanical Drawings, wall plates shall be chrome plated cast brass and floor plates shall be nickel bronze.
- D. Cleanouts shall be full size at the pipe up to 6" inclusive. On larger size piping 6" size plugs shall be used.
- E. Cleanout fittings in vertical stacks shall consist of tapped tees capable of receiving a rough brass raised head cleanout plug, J.R. Smith S-4730, Zurn Z1445-A-BP or approved equal.
- F. All cleanout plugs shall be brass lubricated with graphite before installation.
- G. Cleanouts occurring in cast iron soil pipe above floor at change of direction of pipe run and at ends of horizontal runs shall be J.R. Smith S-4425, Zurn Z1441-A-BP or approved equal with cast iron ferrule for caulk connection and fitted with a straight threaded tapered bronze plug with raised hex head.
- H. Cleanout deck plates for finished areas shall be similar and equal to J.R. Smith 4020 series, Zurn ZB1400-X or approved equal with cast iron ferrule, scoriated cutoff sections, brass cleanout plus collar with brass bolts for waterproofed slabs. In tile floor areas the cleanout deck plates shall be recessed to tile.

2.3 FLASHING

- A. Provide flashing extending at least 10" beyond edge of all floor drains and vents through roof and all floor sleeves in floors with waterproofing or vapor barriers. Flashing shall be held securely in by clamping devices.
- B. All floor drains shall be provided with flashing rings and 24" square 6 lb. sheet flashing, properly flashed into flashing ring of the drain.

2.4 SANITARY DRAINAGE

- A. A complete system of drainage shall be provided as shown on the Drawings. The system shall include all drains, leaders, branches, house drains with all pipe fittings, hangers, anchors, etc. to make a complete sanitary drainage system. The systems shall extend through house drains and terminate as indicated on the Drawings.
- B. Piping shall be sizes as indicated on the Drawings. The sanitary drains shall have a pitch of 1/8" per ft. minimum unless otherwise noted. Branch connections to stacks and house drains shall pitch a minimum of 1/8" per ft.

2.5 PIPING AND FITTINGS

- A. Provide piping of one of the following materials, of weight/class indicated. Provide pipe fittings and accessories of same material and weight/class as pipes, with joining method as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING

- A. The size of soil, waste and vent piping shall be as determined by the State codes, rules and regulations for plumbing and drainage, except where specifically noted to be larger by the Specifications or Drawings and all fixed rules of installation, as set forth in the codes, rules and regulations, shall be followed as part of the Specifications.
- B. This Contractor shall carefully examine the Architectural plans in detail and familiarize himself with all conditions relative to the installation of piping, particularly where same is concealed behind furring or in hung ceilings.
- C. In no case shall this Contractor permit his pipes to be exposed beyond finished plaster lines unless specifically shown on Drawings. He shall consult with the Contractors of other trades in the building and install his piping in such a way as to least interfere with the installation of other trades.
- D. Piping shall be installed, whether indicated or not, so to rise and/or drop to clear any and all conduits, lighting fixtures, ductwork and heating mains to maintain the desired cleat heights. This Contractor shall consult with the Contractors of other trades and facilitate the erection of the equipment and piping.

- E. Run piping straight and as direct as possible in general forming right angles with or parallel to walls or other piping. Risers and stacks shall be erected plumb and true. After cutting, all pipes shall be reamed out to full bore and before erection the inside of all pipes shall be thoroughly cleaned.
- F. No piping or work shall be concealed or covered until all required tests have been satisfactorily completed and work had been approved by the Architect and all other authorities having jurisdiction.
- G. Branch connections shall be made with "Wye" and long "Tee-Wye" fittings, short 1/4 bends, common offsets and double hubs will not be permitted. Short "Tee-Wye" fittings are to be used in vertical piping only. All fittings shall conform to code requirements.
- H. Cleanouts shall be provided at foot of all stacks, at changes of directions, at the ends of branch runs where shown and as required by code and shall be terminated as described under cleanouts.
- I. The house drains must be run at a minimum grade of 1/8" per ft. downward in the direction of flow. Wherever possible, a 1/4" per ft. pitch shall be maintained. Branch connections to stacks from fixtures shall pitch 1/4" per ft. where possible. Attention is again called to the necessity of maintaining the ceiling heights established.
- J. Furnish and install complete systems of vent pipes from the various plumbing fixtures and other equipment to which drainage connections are made. Vent pipes shall be connected to the discharge of each trap and shall be carried to a point above the ultimate overflow level of the fixture before connecting with any other vent pipe; in general, this will be approximately 3'-6" above the finished floor. Branches shall be arranged to pitch back to fixtures.
- K. The individual vent pipes shall be collected together in branch vent lines and connected to existing vent connections through roof.
- L. Any existing vents through roof, damaged, or if flashing on roof comes loose while connecting new vent to them shall be repaired and reflashed to the roof as required to maintain waterproofing the satisfaction of the Architect.

END OF SECTION 220160

SECTION 220300 - PLUMBING FIXTURES AND EQUIPMENT

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

- A. The work under this section shall consist of furnishing all labor, materials, equipment and appliances necessary and required to completely do all plumbing fixture work, as required by the Drawings and as specified herein, including but not limited to the following: plumbing fixtures, traps, fittings, trimmings, brackets, plates, anchor, chair carriers and supports.
- B. Just before the Owner's taking over the work in the building, this Contractor shall thoroughly clean all fixtures furnished and set under this Contract, leaving every fixture in perfect condition and ready for use.
- C. Submit shop drawings and roughing sheets for all equipment for checking and approval.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND EQUIPMENT

- A. All fixtures shall be free from imperfections, true as to line angles, curves and color, smooth, watertight, complete in every respect and practically noiseless in operation, Fixtures specified are given as the typical standard required as manufactured by American Standard and they or other similar approved fixtures as made by Kohler or Eljer Companies shall be furnished, set and connected in good substantial, neat workmanlike manner.
- B. The letter designations hereinafter correspond with the schedule on the Drawings.
 - 1. Water Closet - Type A1
Flush valve type, floor mounted equal to American Standard model 2305.100 "Madera 16-1/8" Universal" vitreous china, siphon jet action elongated bowl, 1-1/2 "top spud, Sloan Royal 115-1.6 low consumption flush valve, Olsonite "95 open front seat cover.
 - 2. Water Closet - Type A2 (Handicapped)
Flush valve type, wall mounted 2257.103 "Afwall" vitreous china, siphon jet action, elongated bowl, 1-1/2" top spud, Sloan Royal 111ES hard wired sensor flushometer, 1.6 GPF, Olsonite #95 open front seat cover. Provide floor mounted carrier equal to Zurn Z1203 series or Z1204 series.

3. Lavatory - Type B1 (Handicapped)
0356.015 "Lucerne" white vitreous china lavatory with 8" centers, concealed arm support, 7723.018 offset grid drain, adjustable trap, loose key stops and all required trim. Sloan Model ETF-600 hard wired faucet with vandal-proof aerator. Mount lavatory 34" above finished floor. Cover "P" trap and supplies and stops with Truebro "Handi-Lav-Guard" insulation kits. Provide hot water temperature control valve Watts Series LF1170 to be piped to hot water sink connection."
4. Classroom Countertop Sink - Type B2
Equal to Elkay model no. DRKAD-3717-R-C, 18 gauge, type 302, two bowls 6" apart, LK-1141-A, no lead Flexi-Guard Bubbler, LK-35 strainer in sink, LK-8 grid strainer in fountain, LK-2439 concealed mounting mixing faucet, 45 degree restricted swing faucet with aerator. Provide hot water temperature control valve Watts Series LF1170 to be piped to hot water sink connection."
5. Faucet – Type B3
Chicago Faucet Model 404-V665-E12 self-closing adjustable palm button faucet with vandal proof aerator. Field measure for compatibility before issuing shop drawing.
6. Electric Water Cooler – Type C (Handicapped)
Elkay EZH20 Bottle Filling Station with B1-Level Reverse Filtered LZ Cooler Model LZSTL8WSLK.
7. Floor Drains:
Josam series 30000A or Zurn Z415 type "B" coated cast iron, two piece body with double drainage flange, flashing collar, weepholes, bottom outlet and adjustable strainer.
8. Wall Hydrants (Interior): J.R. Smith 5609 QT bronze nickel-plated quarter turn with 3/4" hose connection, integral vacuum breaker with vandal resistant cap and T-handle key. Install under lavatories in all toilet rooms.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All fixtures shown on Drawings shall be set, connected and tested by the Contractor. He shall also make all water; soil, waste, vent and other service connections to fixtures as shown on Drawings or as directed and shall set, furnish, connect and test all necessary fittings.
- B. All pipes at fixtures passing into walls, floors or partitions shall be provided with heavy cast brass escutcheons and security (tamperproof) set screws finished to match the pipe. No "waiving" of this section will be permitted.
- C. All fittings escutcheons, faucets, traps, exposed piping etc. shall be brass, chrome plated over nickel plate with polished finish. Any visible hanger nuts shall be security (tamperproof) type and shall likewise be chrome plated over nickel plate.

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- D. This Contractor shall be responsible for protecting all plumbing fixtures including in these Specifications against injury from the building materials, tools and equipment. Any fixtures damaged during the construction period shall be replaced new. After all fixtures are set, this Contractor shall carefully grout all around fixtures.

END OF SECTION 220300

SECTION 220420 - SUPPORTS, SLEEVES AND PLATES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

- A. This Contractor shall furnish and install all plates, hangers and supports for his piping.
- B. All piping shall be hung or supported from structural members only.

PART 2 - PRODUCTS

2.1 PIPING

- A. All piping shall be supported from building structure in a neat and workmanlike manner wherever possible, parallel runs of horizontal piping shall be grouped together on trapeze hangers. Vertical risers shall be supported at each floor line with steel pipe clamps. Use of wire perforated metal to support pipes will not be permitted. Hanging pipes from other pipes will not be permitted.
- B. Necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations shall be furnished and installed. In all cases where hangers, brackets, etc., are supported from concrete construction, care shall be taken not to weaken concrete or penetrate waterproofing.
- C. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers supporting piping expanding into loops, bends and offsets shall be secured to the building structure in such a manner that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted, both in the vertical and horizontal direction, when the supported piping is hot.
- D. Pipe hangers shall be as manufactured by Grinnell, whose catalog numbers are given herein, or equivalent Carpenter and Paterson, or F&S Mfg. Co.
- E. Piping shall be supported as follows unless otherwise indicated on the Drawings:
 - 1. Piping: 1-1/2 inch and smaller Fig. #260 adjustable clevis hanger. 2 inch and larger Fig. #174 one-rod swivel roll hanger.
 - 2. Two-rod hangers shall be used for piping close to the ceiling slab or where conditions prohibit use of other hanger types.
 - 3. Anchors for hanger rods shall be Phillips "Red Head" self-drilling type. Anchors shall be placed only in vertical surfaces.

4. Spacing of pipe supports shall not exceed 6 feet for pipes up to 1-1/2 inch and 10 feet on all other piping.
 5. Hangers shall pass around insulation and a 16 gauge steel protective band; 12 inch long shall be inserted between hangers and insulation.
 6. All piping shall be supported to allow free movement where expanding or contracting. Pipe shall be anchored as required or directed.
 7. All lateral runs of piping shall be securely supported on hangers, rolls, brackets, etc. and in a manner to allow for proper expansion and elimination of vibration.
 8. 2 inch and smaller pipe, where run on walls, shall be supported on wrought iron "J" hook brackets with anchor bolts.
 9. All horizontal pipe, where run overhead or on walls, shall be supported as follows unless otherwise indicated: On adjustable steel clevis type hangers suspended on hanger rods, pipe sizes up to and including 4 inch.
- F. Space limitations in hung ceilings spaces and conditions in other locations may require use of other type of hangers than those specified above. Suitable and approved pipe hangers shall be provided for such job conditions.
- G. All supports shall be fastened to structural members or additional steel supports furnished by this Contractor.
- H. Hanger rods shall be steel, threaded with nuts and lock nuts, sizes in accordance with following schedule:

<u>Pipe Size</u>	<u>Rod Size</u>
3/4" to 2" inclusive	3/8"
2-1/2" and 3" inclusive	1/2"
4" and 5" inclusive	5/8"
6"	3/4"
8" to 12" inclusive	7/8"

- I. Cast iron piping shall be supported at intervals of not more than (5) feet (at each hub) on straight runs.

PART 3 - EXECUTION

3.1 PIPING

- A. Where pipes pass through masonry, concrete walls, foundations, or floors, this Contractor shall set sleeves as are necessary for passage of pipes. These sleeves shall be of sufficient size to permit insulation where required to be provided around pipe passing through. This Contractor shall be responsible for exact location of these sleeves.
- B. Sleeves shall not be used in any portion of building where use of same would impair strength or construction features of the building. Inserts for supporting lateral pipes and equipment shall be placed and secured to form work, and all sleeves inserts locations shall be thoroughly checked with Architect so as not to conflict with other trades.
- C. Where pipes pass through floor or walls, they shall be provided with chromium plated escutcheons.
- D. Anchor horizontal piping where indicated and wherever necessary to localize expansion or prevent undue strain on branches. Anchors shall be heavy forged construction entirely separate from supports.
- E. Anchor vertical piping wherever indicated and wherever necessary to prevent undue strains on offsets and branches. Anchors, unless otherwise noted shall be heavy steel clamps securely bolted and welded to pipes. Extension ends shall bear on building construction.
- F. Auxiliary steel supports that may be required for all mechanical equipment shall be furnished and installed by this Contractor.
- G. All operating equipment including pumps, piping, etc.; shall be supported so as to produce minimum amount of noise transmission.

END OF SECTION 220420

SECTION 220430 - INSULATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

- A. The work under this section shall consist of furnishing all labor, materials, equipment and appliances necessary and required to completely do all insulation work as required by the Drawings and as specified herein including but not limited to the following: Insulation, covering, bands, tie wire.

PART 2 - PRODUCTS

2.1 INSULATION

- A. The materials as specified have been selected from the catalogs of Johns-Manville Sales Corporation and are representative of the quality, design and finish desired. Insulation as manufactured by Owens-Corning Fiberglass Corp. Gustin Bacon Co., or other approved manufacturer may be submitted for approval provided the product meets fully in all respects (such as density, moisture absorption, alkalinity, thermal-conductivity, jackets) to the materials as delineated below.
- B. All insulation shall be UL rated non-combustible type classified flame spread-25, smoke-developed-50.

2.2 PIPING, FITTINGS AND VALVES

- A. All insulation thickness shall be in accordance with the latest edition of the New York State Energy Conservation Construction Code.
- B. Minimum pipe insulation shall be:
 - 1. Hot water piping up to 1-1/4" – 1" insulation. Piping 1-1/2" and larger – 1-1/2" insulation.
 - 2. Cold water piping up to 1-1/2" – 1/2" insulation. Piping 1-1/2" and larger – 1" insulation.
- C. Domestic cold, hot water, hot water return, indirect waste, storm, and piping aboveground. All piping shall be insulated with sectional glass fiber insulation, Owens-Corning 2 piece ASJ/SSL. Joints between sections shall be sealed with factory supplied 3 inch wide sealing strips. Sealing by means of Owens Corning self-sealing lap will also be acceptable. Install (anti-sweat) vapor barriers on all cold water piping.

- D. Domestic hot and cold water valves and fittings - Fittings, valves, etc. shall be insulated with 1 inch (1 lb. per cubic foot density) flexible blanket insulation compressed to 1/2 its thickness, and cover with PVC fittings equal to Zeston 2000 series seal with Zeston Perma-Weld Solvent welding adhesive or Zeston Z-Tape.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All insulation on pipes running through walls, floors, partitions and beams shall be continuous through sleeves and openings.
- B. Insulation shall be installed only after all tests of the piping system have been completed.
- C. All insulation shall fit snugly.
- D. All surfaces shall be clean and dry when insulation is applied.
- E. Longitudinal joints shall be on least conspicuous side off the pipe.
- F. Valves shall be insulated up to the packing unit.
- G. As specified hereinbefore, all horizontal runs of piping will be supported on adjustable clevis or group trapeze type hangers. Pipe hangers will be installed outside of the insulation. Where hangers occur, prefabricated insulation protective saddles shall be "Insul-Shield-Multi-Purpose-Saddle" as manufactured by Insul-Coustic Corp. or approved equal.
- H. Hot and cold water branch piping extending through slab or knockout panels to serve equipment shall be insulated to a point 4 inch above the top of sleeve provided for pipe.
- I. The use of staples shall not be permitted.
- J. It is the intent of this Specification that all vapor barriers be continuous throughout. Reinstate existing piping at point of new pipe connections.

END OF SECTION 220430

SECTION 220470 - TESTS AND ADJUSTMENTS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 TESTS AND ADJUSTMENTS

- A. The Contractor shall, at his own expense, during the progress of the work or upon its completion as ordered make such tests as are specified or as required by and in the presence of the Architects, Building Inspectors, etc. At least 48 hours notice shall be given in advance of all tests.
- B. The Contractors shall provide all apparatus, temporary work or other requirements necessary for all tests. He shall take all due precautions to prevent damage to the building, its contents or the work of the other Contractors, that may be incurred by all tests. This Contractors shall also be responsible for the work of other Contractors that may be damaged or disturbed by the tests or the repair or replacement of his work, and he shall without extra charges, restore to its original condition, any work of other Contractors to do the work of restoration.
- C. Tests on the various systems may be conducted in sections as the work progresses or when the systems are completed.
- D. No caulking of pipe joints to remedy leaks will be permitted except where joints are made with lead and oakum.
- E. Each section of the sanitary, storm and vent piping tested shall have all openings tightly closed with screw plugs, or equal device. The drainage and vent systems shall be filled with water and proven tight under a 10'-0" head for a minimum of four (4) hours. Water level must remain constant through test without adding water.
- F. Upon final completion of the sanitary systems and when all fixtures and appurtenances have been set and the systems are in complete working order, all traps in the systems shall be filled with water and a thick penetrating smoke shall be introduced into the entire system.
- G. As smoke appears at the stack openings on the roof, such openings on the roof shall be tightly closed and a pressure equivalent to 1-1/2 inch of water shall be maintained during the test. Oils of peppermint shall be added at the smoke making machines so that any leakage is readily discernible.
- H. Before any covering is applied to the domestic water piping systems, the entire domestic water piping systems shall be hydrostatically tested for eight (8) hours to a hydraulic pressure of 125 psig.
- I. At the completion of the test, Contractor shall furnish the Owner with one (1) copy of test certificates as issued by the insurance company.

- J. Adjustments: Tests and adjustments shall be repeated as often as necessary until the systems are tight and are to the entire satisfaction of the Plumbing Inspector, Engineers and any other authorities having jurisdiction.
1. Contractor is to thoroughly instruct the building custodian in the proper care and operation of the entire system. Contractor shall prepare for use by custodian, detailed brochures of instructions in non-technical terms, describing the maintenance and operation of all fixtures, apparatus, valves, controls etc. furnished by him.
 2. Should any part of the work performed under this Contract fail to function because of cracked piping, obstructions, debris in piping, leaks in piping or any other cause, this Contractor shall disconnect, clean and reconstruct the work at his own expense and pay for any damages to adjoining work.
 3. Water flow is to be balanced and adjusted to all flush valves, faucets, etc.
 4. All parts of the plumbing system are to be thoroughly flushed until cleared of all grease and sediment and all dirt pockets cleaned. Repeat as often as necessary, open all cleanouts and reset in graphite.
 5. All new motors shall be oiled as required.
 6. All new valves are to have stuffing boxes packed and adjusted.

END OF SECTION 220470

SECTION 220480 - TAGS, CHARTS AND IDENTIFICATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 TAGS, CHARTS AND IDENTIFICATION

- A. Every valve installed under this Contract shall be tagged or labeled as follows: Tag shall be etched brass securely fastened to valve handwheels with heavy brass "S" hooks, soldered closed. At lock shield and similar type valves, tags for same shall be securely wired to valve body.
- B. Charts shall be provided for each piping system, as approved and shall consist of schematic diagrams of piping layouts showing and identifying each valve and piece of equipment etc., and its use. Upon completion one (1) copy of diagrams and valve charts suitably framed under glass, shall be furnished and mounted where directed. One (1) copy of diagrams and valve charts shall be delivered to Owner.
- C. This Contractor shall provide on all piping, semi-rigid, wrap around plastic identification markers equal to Seton Snap-Around and/or Seton Strap-On pipe markers.
- D. Each marker background is to be appropriately color coded with a clearly printed legend to identify the contents of the pipe. Directions of flow arrows are to be included on each marker.
- E. Identification of all piping shall be adjacent to each valve, at each pipe passage through wall, floor and ceiling construction and at each branch and riser take-off.
- F. Identification shall be on all horizontal pipe runs, marked every 15 ft. as well as at each inlet outlet of equipment at changes in direction.

END OF SECTION 220480

SECTION 220490 - GUARANTEE

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 GUARANTEE

- A. The Contractor shall remove, replace and/or repair at his own expense and at the convenience of the Owner, any defects in workmanship, materials, ratings, capacities and/or characteristics occurring in the work within one (1) year or within such longer period as may be provided in the Drawings and/or Section of the Specifications, which guarantee period shall commence with the final acceptance of the entire Contract in accordance with provisions stated in the General Conditions, and the Contractor shall pay for all damage to the system resulting from defects in the work and all expenses necessary to remove, replace and/or repair and any other work which may be damaged in removing, replacing and/or repairing the work.

END OF SECTION 220490

SECTION 230100 - GENERAL CONDITIONS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 GENERAL CONDITIONS

- A. Before submitting a proposal, Bidders shall examine all related to this work and shall become fully informed as to the extent and character of the work required and its relation to the other work in the building.
- B. Before commencing work, the Contractor will examine all conditions of the project upon which his work is in any way dependent for perfect workmanship according to the intent of this Specification. No "waiver of responsibility" for incomplete, inadequate or defective adjoining work will be considered unless notice has been filed by this Contractor and acceded to by the Owner's representative in writing before the Contractor begins any part of the work.
- C. The Contractor will pay for all licenses, permits and inspection fees required by civil authorities having jurisdiction. Comply with all laws, ordinances, regulations, and fire underwriter's requirements applicable to work herein specified without additional expense to the Owner.
- D. Small scale drilling through walls and floors or cutting of piping insulation which may contain asbestos shall be performed by a person with a "restricted asbestos handler allied trades certificate" and shall have a copy of it in his possession at all times while working of the project. This shall also apply to removal of piping, ductwork or equipment insulation.
- E. It is specifically intended that anything (whether material or labor), which is usually furnished as a part of such equipment, as is hereinafter called for (and which is necessary for the completion and proper operation) shall be furnished as part of this Contract without additional cost the Owner, whether or not shown in detail or described in the Specifications.
- F. When Drawings and Specifications conflict or there is a question as to the proper intent of this Contract, the Contractor shall assume the greater quantity, the higher quality and/or the more expensive method in his pricing. All questions shall be directed to the Architect/Engineer in writing only and only up to ten (10) days prior to bidding.
- G. The Drawings indicate the general runs of the piping, ductwork, etc. systems and the location of equipment and apparatus, however it shall be understood that the right is reserved by the Architect/Engineer to change the location of piping work, ductwork, equipment and apparatus to a reasonable extent as building conditions may dictate, prior to their installation without extra cost to the Owner.

- H. All components supplied by this Contractor shall be UL listed and/or ETL labeled and shall conform to ASHRAE Standard 15.

- I. Any changes from the Drawings and Specifications and any interpretation thereof shall have the prior approval of the Architect/Engineer. The Contractor shall submit in writing, at the time of signing the Contract, any items of necessary labor and materials, which, in his opinion, are lacking in requirements of the Drawings and Specifications to insure a complete job in all respects. No consideration will be granted to alleged misunderstanding of materials to be furnished, work to be done, or conditions to be complied with, it being understood that the tender of a proposal carries with it the agreement to all items and conditions referred to herein or indicated on the accompanying Drawings.

END OF SECTION 230100

SECTION 230110 - SCOPE OF WORK

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 SCOPE OF WORK

- A. The work under this section includes all labor, materials, equipment, tools, transportation, and the performance of all work necessary and required for the furnishing and installation complete of all work as shown on the Contract Documents, including but not necessarily limited to the following:
1. Rooftop HVAC units and related appurtenances.
 2. VRF Heat Pumps Systems.
 3. Energy Recovery units and related appurtenances.
 4. Exhaust fans and related appurtenances.
 5. All required piping, valves, and related specialties.
 6. Fin-tube radiation.
 7. Sheetmetal ductwork and related accessories.
 8. Duct and pipe insulation.
 9. Registers, diffusers, and dampers.
 10. Rigging of equipment.
 11. Furnish all combination motor starter/disconnects for equipment (with the exception of starters and electric items already mounted on equipment or equipment not requiring same). Fan motor starter/disconnects shall have contacts for ATC connection and a terminal block connection for Fire Alarm fan shutdown. Starters per manufacturers recommendations. Underwriters inspection and certificate required. Coordinate with Electrical Contractor.
 12. Air and Water Balancing.
 13. Automatic temperature controls with complete wiring (regardless of voltage).
 14. Testing, adjusting and start-up of equipment.
 15. Painting and identification of all equipment and piping.
 16. Firestopping per NFPA requirements (UL approved systems).

17. Operating and maintenance instructions.
18. As-Built Drawings - Refer to Division 1.
19. Cutting and Patching - Refer to Division 1.

- B. Coordination Drawings (if applicable): Attention is directed to Division 1 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".

1.2 REMOVALS

- A. Removals should be coordinated with other trades affected.
- B. Removal of any piece of equipment or terminal device shall include removal of connecting ductwork and piping back to existing mains that remain. Cap each branch air/water-tight. Controls and control components shall also be removed. Do not leave components (controllers, pneumatics, etc.) that have no function. Provide control wiring, ductwork, piping, etc. as necessary to maintain continuity of service for equipment or terminal devices to remain.
- C. Piping which penetrates the construction may be cut and capped provided capping is done beneath the finished surfaces so that construction over it can be achieved.
- D. All removals shall be removed from the site.

1.3 ALTERATION WORK

- A. All equipment, piping, control components, etc. to be removed, shall be disposed of or salvaged as directed by the Owner. They shall not be removed from the premises without the Owner's approval.
- B. All piping to be removed shall be properly plugged or capped so that upon completion of all new work, all abandoned piping shall be concealed in finished areas.
- C. No dead ends shall be left on any piping upon completion of job. The existing system shall be left in perfect working order upon completion of new work.
- D. Location and sizes of existing piping, ductwork, equipment, etc. are approximate. Exact sizes and locations of all existing work shall be verified on the job.

End of Section 230110

SECTION 230200 - HYDRONIC SPECIALTIES

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 AIR VENTS

- A. Install at all high points automatic air vents to eliminate air binding. All automatic air vents shall be approved heavy duty type equipped with petcocks and tubing for manual venting. All vents installed in coils, etc. shall be of manual key operated type.
- B. All vents concealed from view shall be accessible through access doors. Vents shall be by Hoffman, Anderson or ITT Bell & Gossett, 125 psig rated.

2.2 PRESSURE GAUGES

- A. Furnish and install pressure gauges on suction and discharge sides of each pump and as required to check operation of equipment; pressure gauges shall have 4-1/2" diameter dials, Ashton, Ashcroft or approved equal.

2.3 THERMOMETERS

- A. Install thermometers at all locations in piping system as noted on Drawings and as required to check system performance. Thermometers shall be installed at the supply and return of coils and 3-way diverting valves as manufactured by Trerice, Weksler or Moeller, with 4-1/2 inch face, cast aluminum case, chrome plated steel ring, white background with black embossed markings, glass window, stainless steel pointer, brass movement, 316 stainless steel bulb. Provide separable, universal angle sockets for all thermometers.

2.4 COMBINATION BALANCING / SHUT-OFF VALVES (Circuit Sensors /Setters and Flow Meters)

- A. Provide Circuit Sensor/Setter balance valves as manufactured by Bell & Gossett or approved equal.
- B. Circuit Sensors: Furnish and install, as shown on Drawings, a cast iron wafer-type flow meter designed for low pressure drop operation.
 - 1. The flow meter will be equipped with brass readout valves (with integral check valve) for taking differential pressure readings across the orifice of the flow meter.
 - 2. The flow meter shall be designed to operate at a maximum working pressure of 300 psig at 250 degrees F.

3. The flow meter must be furnished with a calibrated nameplate for determining an accurate system flow rate.
 4. Each flow meter shall be ITT Bell & Gossett Circuit Sensor Flow Meter model no. OP.
- C. Circuit Setters: (1/2"-3") Furnish and install as shown on Drawings and with manufacturer's recommendations Bell & Gossett® Circuit Setter® Plus calibrated balance valve Model CB or Model MC as manufactured by Xylem.
1. Valves to be designed to allow installing Contractor to pre-set balance points for proportional system balance prior to system start-up.
 2. Valve body shall be constructed out of lead-free brass.
 3. Valve shall include a ball valve constructed in 304 Stainless Steel.
 4. Valve shall be AB1953, and CSA certified and compliant with Vermont 152S, Maryland House Bill HB372, Senate Bill S.3874, and NSF/ANSI-372.
 5. Valve body shall include two pressure/temperature ports.
 6. Valve body shall include an optional drain valve port.
 7. Valve shall utilize a calibrated nameplate with a memory stop.
 8. Valve shall utilize a reduced port design that provides velocity head recovery.
 9. Valve temperature range shall be from -4°F (-20°C) to 250°F (121°C).
 10. Model CB: Valve shall have either NPTF thread or SWTF end connections.
 11. Model CB: Valves with NPT end connections shall be rated for 400 PSIG working pressure.
 12. Model CB: Valves with SWTF end connections shall be rated for a maximum of 300 PSIG working pressure.
 13. Model MC: Valve shall be rated for 300 PSIG working pressure.
 14. Model MC: Valve shall include a SWTF or NPTF fixed end connection on the discharge end and a union tailpiece adapter with choice of SWTF, NPTF thread, or NPTM thread tailpiece connection on the supply end. The union tailpiece end should include a union nut that can secure the tailpiece to the body of the valve to create a water-tight seal.

15. Valves to have memory stop feature to allow valve to be closed for service and then reopened to set point without disturbing balance position. All valves to have calibrated nameplate to assure specific valve settings. Valves to be leak-tight at full rated working pressure. Valves 4-inch pipe size to be of cast iron body/brass vane construction with differential pressure read-out ports fitted with internal EPT insert and check valve.
 16. Provide Extended Pressure/Temperature Ports and Drain Valve/Extended Drain Valve
- D. Circuit Setters: (4"-12") Furnish and install as shown on Drawings and with manufacturer's recommendations Bell & Gossett® Circuit Setter® Plus calibrated balance valve Model CB as manufactured by Xylem.
1. Valves to be designed to allow installing Contractor to pre-set balance points for proportional system balance prior to system start-up.
 2. Valve body shall be constructed out of cast iron and rated for 175 PSIG working pressure (if flanged) or constructed out of ductile iron and rated for 300 PSIG working pressure (if grooved).
 3. Valve shall be a multi-turn globe style valve.
 4. Valve shall include a brass disc.
 5. Valve disc shall have a soft seat design made of EPDM.
 6. (If Flanged) Valves shall include ANSI Class 125# flanged connections.
 7. (If Grooved) Valves shall include grooved end connections.
 8. Valve body shall include two pressure/temperature ports.
 9. Valve shall utilize a calibrated nameplate with position indicator from 0 to 100% open.
 10. Valve shall include a memory button to allow for positioning the valve to the appropriate set position after closing.
 11. Valve temperature range shall be from -4°F (-20°C) to 250°F (121°C).
 12. Valves to have memory stop feature to allow valve to be closed for service and then reopened to set point without disturbing balance position. All valves to have calibrated nameplate to assure specific valve settings. Valves to be leak-tight at full rated working pressure. Valves 4-inch pipe size to be of cast iron body/brass vane construction with differential pressure read-out ports fitted with internal EPT insert and check valve.

- E. Readout Meters: Provide a portable Readout Meter with provision for hanging, capable of indicating pressure differential across a system component. Unit to be complete with all necessary hoses, shut-off and vent valves, and carrying case. Reading range to be .5' to .16'. Read Out Kits to be ITT Bell & Gossett model no. RO-3.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories, and components.
- B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

- A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION 230200

SECTION 230245 – ROOF MOUNTED ENERGY RECOVERY VENTILATOR UNITS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

A. Product Specification

1. The Energy Recovery Ventilator shall be as manufactured by "Systemair" or approved equal provided all specifications are met. Systemair ERV commercial series shall be used as the basis of design.

B. Requirements

1. Unit shall be listed to safety standard UL 1812, Ducted Heat Recovery Ventilators.
2. Performance shall be as scheduled on plans.
3. Exhaust discharge hood shall have integrated backdraft damper.
4. The unit shall be capable of operating in winter and summer conditions without any loss of ventilation capacity.
5. The Energy recovery wheel shall be of aluminum counter flow construction type coated with a thin non-migrating adsorbent layer.
6. The fans shall be external-rotor motorized impellers powered by electronically commutated (EC) motors, controlled by a provided potentiometer or by a 0-10 VDC or 4-20 mA signal provided by others.

PART 2 – PRODUCTS

A. Cabinet

1. Cabinet shall be constructed of G90 galvanized, 20 gauge steel sheet. All exposed surfaces shall be coated with baked powder paint. All seams shall be sealed, requiring no caulking at job site.
2. Unit casing shall be double wall with 1 inch fiberglass insulated. The flame spread index of the insulation material shall not be over 25 and its smoke developed index shall not be over 50 when tested in accordance with the Standard for Tests for Surface Burning Characteristics of Building Material, UL723.

B. Weather hoods

1. Weather hoods shall be constructed of G90 galvanized, 20 gauge steel sheet.
2. The fresh air weather hood shall be protected by MERV1 washable filter.

3. Weather hoods shall be designed to prevent wet snow and large water droplets from entering the unit.
4. The fresh air weather hood shall maintain a face velocity less than 340 ft/min.

C. Energy Recovery Wheel

1. The rotor matrix shall be made of a corrosion resistant aluminum alloy that is composed of alternating corrugated and flat, continuously wound layers of uniform widths; that guarantees laminar air flow, and low static pressure loss. The rotor wheel shall be reinforced with spokes, welded at the hub and perimeter to prevent any uneven run out during normal operations. All corrugated surface shall be coated with a thin non-migrating adsorbent layer. The wheels effectiveness shall be clearly documented in accordance with ASHRAE 84 and AHRI 1060 standards. The flame spread index of the energy recovery wheel shall not be over 25 and its smoke development index shall not be over 50 when tested in accordance with the Standard for Tests for Surface Burning Characteristics of Building Material, UL723.

D. Electrical

1. Electrical box shall be isolated from the airflows and all integral wires and connections protected.
2. All internal electrical components shall be factory wired for single point power connection. When equipped with Electric pre-heater option, a second point connection will be required.
3. All electrical components shall be UL Listed or Recognized and ETL Certified or Accepted where applicable and wired in compliance with the National Electrical Code.

E. Fan Sections & Motors

1. Fans shall be backward inclined motorized impellers.
2. Motors shall be electronic-commutate (EC), controlled by a provided potentiometer or by a 0-10 VDC or 4-20 mA signal provided by others.
3. Fan motor shall have maintenance-free permanently lubricated sealed ball bearings.
4. Fan motor shall be (TOP) thermal overload protected.
5. Fan motor shall be UL listed to UL1004 and/or UL2111, CSA C22.2 No. 77 and No.100.
6. Fan motor shall have IP protection class 44 or 54 according to DIN 40 050.
7. Separate fans for exhaust and supply blowers shall be provided.

F. Filters

1. The outdoor air shall be protected by MERV13 2 inches or 3.75 inches pleated filters constructed to meet UL 900.
2. The return air shall be protected by MERV8 2 inches or 1.75 inches pleated filters constructed to meet UL 900.

PART 3 – EXECUTION

A. Serviceability

1. Unit shall have hinged and/or screwed access panels on front.
2. Energy recovery wheel, filters and motors shall be serviceable from the front of the unit.
3. Fan assemblies shall be mounted on a removable sliding base. Energy recovery wheel and filters shall be mounted in slide-out rails for ease of inspection, removal, and cleaning.

B. Installation

1. Unit shall be seated on a roof curb or on a platform.
2. Openings shall be provided for suitable ductwork connection.

C. Warranty

1. The energy recovery ventilator shall be warranted to be free from defects in material, workmanship and on all parts for a period of 3 year from the purchase date. The energy recovery wheel shall be warranted to be free from defects in material and workmanship for a 3 years period under circumstances of normal use.

END OF SECTION 230245

SECTION 230250 – PACKAGED ROOFTOP UNITS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

- A. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic, suction gas cooled, direct drive compressor(s) for cooling duty and nickel chromium elements for heating duty.
- B. Factory assembled, single- piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start- up.
- C. Unit shall use environmentally sound, R-410A refrigerant.
- D. Unit shall be installed in accordance with the manufacturer's instructions.
- E. Unit must be selected and installed in compliance with local, state, and federal codes.

1.2 QUALITY ASSURANCE

- A. Unit meets ASHRAE 90.1 minimum efficiency requirements.
- B. Unit shall be rated in accordance with AHRI Standards 210/240 or 340/360.
- C. Unit shall be designed to conform to ASHRAE 15.
- D. Unit shall be CSA tested and certified in accordance with ANSI Z21.47 -2016/CSA 2.3-2016, and CSA C22.2 No. 60335-2-40.
- E. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- F. Unit casing shall be capable of withstanding 750- hour salt spray exposure per ASTM B117 (scribed specimen).
- G. Roof curb shall be designed to conform to NRCA Standards.
- H. Unit shall be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory and must be available upon request.
- I. Unit shall be designed in accordance with CSA C.22.2 NO.60335-2-40, including tested to withstand rain.
- J. Unit shall be constructed to prevent intrusion of snow into the control box.

- K. Units shall be shake tested to Truck 2, ASTM D4169 to ensure shipping reliability.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Unit shall be stored and handled per manufacturer's recommendations.
- B. Overhead crane can be used to place the units on a roof using rigging holes built into the unit base rails without any additions to the unit.
- C. Unit shall only be stored or positioned in the upright position.

PART 2 - PRODUCTS

2.1 INSULATION

- A. Evaporator fan compartment:
 - 1. Interior cabinet surfaces shall be insulated with a minimum 0.5 in. thick, fiber glass insulation with thermal conductivity of 0.23 or better, adhered with water based adhesive.
 - 2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- B. Economizer and Control compartment:
 - 1. Interior cabinet surfaces shall be insulated with a minimum 0.5 in. thick, fiber glass insulation with thermal conductivity of 0.23 or better, adhered with water based adhesive.
 - 2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- C. Partition and Duct Panel:
 - 1. Interior cabinet surfaces shall be insulated with a minimum 0.5 in. thick, fiber glass insulation with thermal conductivity of 0.23 or better, adhered with water based adhesive.
 - 2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- D. Base Pan and Blower Back:
 - 1. Interior cabinet surfaces shall be insulated with a minimum 0.5 in. thick, foil faced fiber glass insulation with thermal conductivity of 0.23 or better, adhered with water based adhesive.
 - 2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

2.2 DIRECT-DIGITAL CONTROL SYSTEM

A. Simplicity SMART Equipment Control

1. Shall be ASHRAE 62 complaint.
2. Shall accept 20-30 VAC input power, 50/60Hz. 24 VAC nominal.
3. Shall have an operating temperature range from -40°F to 158°F; 10-90% RH (non-condensing UI), and -4°F to 158°F; 10-90% RH (non-condensing), with a storage temperature range from -40°F to 194°F; 5-95% RH (non-condensing).
4. Shall include an option of an Economizer microprocessor controller which communicates directly with the Unit Control Board and has 8 Analog outputs, 2 Analog inputs, 2 Binary outputs, 3 Binary inputs.
5. Controller shall accept the following inputs: space temperature, return air temperature sensor, set point adjustment, outdoor air temperature, indoor air quality, outdoor air quality, indoor relative humidity, compressor lock-out, fire/smoke shutdown, single and dual enthalpy, fan status, remote time clock, Sensor Actuator (SA) Bus communicated temperature/humidity/CO2 values from Network sensors, Field Controller (FC) Bus Network Overrides for space temperature, outdoor air temperature, space humidity, outdoor air quality, Indoor air quality, System purge.
6. Shall accept a CO2 sensor or multiple CO2 sensors networked together in the conditioned space and be Demand Control Ventilation (DCV) ready.
7. Shall provide compressor short-cycle protection with minimum compressor runtime set at 3 minutes standard and adjustable from 2 to 7 minutes.
8. Unit shall provide surge protection for the controller through a circuit breaker.
9. Shall have open communication protocols with all required points exposed. Protocols supported include: BACnet®, MS/TP, Modbus®, and N2 communication.
10. Shall have an LCD display on the Unit Control Board to display fault messages as well as navigate the menu structure to review and change set points.
11. Shall utilize a USB connection to allow for uploading and downloading of data.
 - a. USB shall allow for downloading of “trending data” for analysis of inputs and values on other device such as a PC.
 - b. USB shall allow for uploading of new firmware to the UCB.
 - c. USB shall allow for backing up controller set points and parameters and for uploading of these same parameters to the UCB.

12. Shall include an RJ-12 port to be used with a Wi-Fi signal transmitting device and allow unit(s) access via any non-proprietary smart device.
 - a. Unit access shall include ability to view and change all adjustable parameters and set points using the same characteristics and values available directly through the UCB joystick and LCD display.
 - b. Unit access shall be configurable at 3 different levels to allow control over parameter and set point changes.
 - c. Wi-Fi transmitting device can be connected by 3 means.
 - i. RJ-12 port connected directly to UCB.
 - ii. Optional connection port mounted in operating space.
 - iii. Optional connection to building network allowing unit access from any internet browser worldwide.
13. Shall have the capability to integrate with Verasys zoning controls system.
14. Shall not require any proprietary software or contractor tool to start-up, commission and troubleshoot unit operation.
15. Software upgrades will be accomplished by local download via USB port on main Unit Control Board.
16. Shall be UL Recognized, File E107041, UL 916, Energy management Equipment, UL 60335-2-40, Heating and Cooling Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class B, CSA 22.2 No. 236, Signal Equipment Industry Canada, ICES-003 Recognized, and BTL certified.

2.3 ELECTRIC AND ELECTRONIC CONTROL SYSTEM

A. General:

1. Shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-v transformer side. Transformer shall have minimum 75VA capability.
2. Shall utilize color-coded wiring.
3. Shall include a central control terminal board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, gas controller, economizer, thermostat, DDC control options, and low and high pressure switches.

B. Safeties:

1. Compressor over-temperature and over-current.
2. Low pressure switch and high pressure switch.
 - a. Low pressure switch shall use different color wire than the high pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.

3. Automatic reset, motor thermal overload protector.
4. Electric heat section shall be provided with the following minimum protections:
 - a. Primary, backup and auxiliary high temperature limit switches

2.4 PANEL AIR FILTERS

A. Standard Filter Section

1. Shall consist of factory installed, low velocity, disposable 2- in. thick fiberglass filters of commercially available sizes.
2. Units can accept 2" or 4" filters and have a field convertible transition.
3. Filters shall be accessible through an access panel; hinged panel with toolless access is available as described in the Special Features Options and Accessories section of this specification.

2.5 OPERATING CHARACTERISTICS

A. General

1. Unit shall be capable of starting and running at 115°F (52°C) ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 340/360 at + 10% voltage.
2. Compressor with standard controls shall be capable of operation down to 45°F (7°C), ambient outdoor temperatures. Intermittent cooling shall be operational down 0° F (-17° C). Low ambient kit is necessary if mechanically cooling at ambient temperatures below 40°F (4°C).
3. Unit shall be factory configured for vertical supply & return configurations.

B. Electrical Requirements

1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.

C. Unit Cabinet

1. Unit cabinet shall be constructed of galvanized steel with exterior surfaces coated with a non-chalking, powder paint finish, certified at 750 hour salt spray test per ASTM-B117 standards.
2. Unit cabinet exterior paint shall be: film thickness, (dry) 3.0 MILS minimum, gloss (per ASTM D523, 60°F / 16°C): 80+/-5, Hardness: H- 2H Pencil hardness.

3. Unit cabinet shall have gas utility entry holes in the side of the unit and in the unit underside. Entry holes shall not require field setup and shall be capped from the factory to prevent water intrusion when not in use.
 4. Unit cabinet shall have electric utility entry locations marked from the factory with a dimple for accuracy of field drilling. Entry locations shall be available for entry through the side of the unit or from the unit underside.
 5. Base Rail
 - a. Unit shall have base rails on all 4 sides.
 - b. Holes shall be provided in the base rails for rigging shackles to facilitate maneuvering and overhead rigging.
 - c. Holes shall be provided in the base rail for moving the unit by fork truck.
 - d. Base rail shall be a minimum of 15 gauge thickness.
 6. Condensate pan and connections:
 - a. Shall be a multidirectional internally sloped condensate drain pan made of a non- corrosive material.
 - b. Shall comply with ASHRAE Standard 62.
 - c. Shall use a 1" NPT female drain connection through the side of the drain pan. Connection shall be made per manufacturer's recommendations.
 - d. Shall include intentional "overflow notch" and water containment path to guide flow of water where desired in the event of a drain pan overflow.
 7. Top panel:
 - a. Shall be a multi piece top panel.
 8. Electrical Connections
 - a. All unit power wiring shall enter unit cabinet through a field drilled hole located by a factory provided dimple.
 - b. Through- the- base capability.
 - i. Standard unit shall have a through- the- base electrical location(s) using a raised, embossed portion of the unit base-pan.
 - ii. No base-pan penetration, other than those authorized by the manufacturer, is permitted.
- D. Electric Heating
1. Use nickel chromium elements for heating.
 2. See schedule for kW heaters.
 3. Shall have a primary limit control with automatic reset to prevent the heating element system from operating at an excessive temperature.

4. Shall have a non-resetting backup limit control to prevent the heating element system from operating at an excessive temperature in the event a primary limit control fails.
5. Shall be wired for single point power supply with branch circuit fusing (where required).

E. Coils

1. Evaporator Coils, Aluminum Fin - Copper Tube:
 - a. Standard evaporator coils shall have aluminum plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
 - b. Shall be leak tested to 150 psig, pressure tested to 250 psig, and burst qualified to CSA C22.2 No. 60335-2-40.
 - c. Assembled unit shall be pressure tested to 450 psig.
2. Condenser Coils, All Aluminum Microchannel:
 - a. Condenser coils shall have all aluminum microchannel design consisting of aluminum multiport flat tube design and aluminum fin. Coils shall be a furnace brazed design and contain epoxy lined shrink wrap on all aluminum to copper connections.
 - b. Microchannel condenser coils shall be leak tested to 150 psig, pressure tested by supplier to 600 psig, and burst qualified to CSA C22.2 No. 60335-2-40.
 - c. Assembled unit shall be pressure tested to 450 psig.

F. Refrigerant Circuits

1. Constant Volume and 2 stage IntelliSpeed airflow options shall have 2 refrigerant circuits with 2 stages of cooling.
2. 4 stage IntelliSpeed and Variable Air Volume airflow options shall have 2 independent refrigerant circuits with 4 stages of cooling.
3. Refrigerant circuit shall include the following control, safety, and maintenance features:
 - a. Thermostatic Expansion Valve (TXV) shall help provide optimum performance across the entire operating range.
 - b. Refrigerant filter drier - Solid core design.
 - c. Service gauge connections on suction and discharge lines.
4. Compressors
 - a. Unit shall use fully hermetic scroll compressors for each independent refrigeration circuit.
 - b. Two stage models shall use a single stage compressor on each refrigeration circuit.

- c. Four stage models that are 15, 17.5, or 20 tons shall use a two stage compressor on circuit one and a single stage compressor on circuit two.
- d. Four stage models that are 25 or 27.5 tons shall use a tandem compressor set on circuit one and a single stage compressor on circuit two.
- e. Compressor motors shall be cooled by refrigerant gas passing through motor windings.
- f. Compressors shall be internally protected from high discharge temperature conditions.
- g. Compressors shall be protected from an over- temperature and over-ampereage conditions by an internal, motor overload device.
- h. Compressor shall be factory mounted on rubber grommets.
- i. Crankcase heaters shall be installed in the factory as needed on tandem compressor sets.

G. Evaporator Fan and Motor

1. Evaporator Fan Motor:

- a. Shall have permanently lubricated ball-bearings.
- b. Shall have inherent automatic- reset thermal overload protection.
- c. The job site selected brake horsepower shall be required to not exceed the motor's nameplate horsepower rating plus the service factor.

2. Evaporator Fan:

- a. Fan shall be a belt drive assembly with an adjustable pitch motor pulley.
- b. Blower bearings shall have an L10 life of 100,000 hrs.
- c. Shall use sealed, permanently lubricated ball-bearing type.
- d. Shall use dual blower design consisting of two balanced blower fans on a single shaft.
- e. Blower fan shall be double- inlet type with forward- curved blades.
- f. Shall be constructed from steel with a corrosion resistant finish and dynamically balanced.

H. Condenser Fans and Motors

1. Condenser fan motors:

- a. Shall be a totally enclosed motor.
- b. Shall use permanently lubricated ball-bearings.
- c. Shall have inherent thermal overload protection with an automatic reset feature.
- d. Shall use a shaft- down design.

2. Condenser Fans:

- a. Shall be a direct- driven propeller type fan.

I. Special Features Options and Accessories

1. Variable Frequency Drive (VFD). Available on multi-speed (IntelliSpeed) and VAV indoor fan motor options:
 - a. Shall be installed inside the unit cabinet, mounted, wired and tested.
 - b. Shall contain Electromagnetic Interference (EMI) frequency protection.
 - c. Insulated Gate Bi- Polar Transistors (IGBT) used to produce the output pulse width modulated (PWM) waveform.
 - d. Built in LED display and controls. Does not require additional kit or options.
 - e. RS485 capability standard.
 - f. Electronic thermal overload protection.
 - g. All printed circuit boards shall be conformal coated.

2. Low Leak Economizer:
 - a. Integrated, tie-bar driven parallel modulating blade design type capable of simultaneous economizer and compressor operation.
 - b. Damper blades shall be galvanized steel with tie-bar metal linkages. Plastic or composite blades on intake or return shall not be acceptable.
 - c. Damper blades shall be class 1A dampers.
 - d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below set points.
 - e. Shall be equipped with tie-bar driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
 - f. Economizer shall comply with, and be certified to, the AMCA 511 standard.
 - g. Standard leak rate shall be equipped with dampers not to exceed 3 cfm/ft² leakage at 1 in. wg pressure differential.
 - h. Economizer controller shall be the Johnson Controls SE Economizer Controller.
 - i. On- board Fault Detection and Diagnostics (FDD) that senses and alerts when the economizer is not operating properly, meets the requirements for California Title 24, IECC 2015, and ASHRAE 90.1.
 - ii. Display alarms if the following occur
 - Economizer is economizing when conditions do not support
 - Economizer is not economizing when conditions do support
 - Damper Stuck
 - Excess Outdoor Air
 - Failed Sensor
 - iii. Automatic sensor detection
 - iv. Capabilities for use with multiple- speed indoor fan systems
 - v. Utilize digital sensors: Dry bulb and Enthalpy
 - vi. UL, CSA, and ICES-003 recognized and FCC compliant to CFR47

- i. Shall be capable of introducing up to 100% outdoor air.
 - j. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air and contain seals that meet ASHRAE 90.1 requirements. Barometric relief can be replaced by optional power exhaust.
 - k. Shall be designed to close damper(s) during loss- of- power situations with spring return built into motor.
 - l. Dry bulb outdoor air temperature sensor shall be provided as standard. Single or dual enthalpy sensing is available as a factory or field installed sensing option. Outdoor air sensor set point shall be adjustable and shall range from 40° to 80°F / 4° to 27°C. Additional sensor options shall be available as accessories.
 - m. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.
 - n. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy.
 - o. Dampers shall be completely closed when the unit is in the unoccupied mode.
 - p. Economizer controller shall accept a 2- 10 Vdc CO2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.
 - q. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.
3. Barometric Relief Damper:
- a. Shall contain all materials necessary to field install a barometric relief damper capable of relieving up to 100% return air and contain seals that meet ASHRAE 90.1 requirements.
4. Motorized Damper:
- a. Damper shall be a Two-Position Damper. Damper travel shall be from the full closed position to the full open position, depending on model selected.
 - b. Assembly shall include adjustable block off to allow air entry of 0% to 25% or 0% to 100% (dependent on selected option) of maximum allowed outside air.
 - c. Damper shall include multiple blades, tie-bar driven dampers and actuator motor.
 - d. Damper shall close upon indoor (evaporator) fan shutoff and/or loss of power.
 - e. The damper actuator shall plug into the rooftop unit's wiring harness plug. No hard wiring shall be required.
 - f. Outside air hood shall include aluminum water entrainment filter.

5. MagnaDry Dehumidification System:
 - a. The MagnaDry Dehumidification system is factory installed and provides dehumidification of an occupied space while maintaining temperature control utilizing a hot gas reheat coil.
 - i. Determination of unit functionality in straight cooling, straight heating, or reheat mode shall come from standard SSE control board.
 - ii. Reheat mode shall utilize a specific reheat coil placed after the evaporator coil to heat the conditioned air back to a neutral temperature when the occupied space requires dehumidification, but the temperature requirements are satisfied.
 - iii. The reheat circuit shall utilize a 3-way electronic controlled valve to modulate the refrigerant between the condenser circuit and reheat circuit.
 - iv. Changeover from cooling mode to reheat mode shall be accomplished in 30 seconds or less.
6. Phase Monitor:
 - a. Shall provide protection against phase reversal, phase loss, and phase unbalance.
 - b. Switch shall automatically shut off unit control circuit if any of the above conditions is detected.
 - c. Shall have visual LED indication of operational status.
7. Hinged and toolless access panels:
 - a. Cabinet panels shall be hinged
 - b. Shall provide easy access with toolless latching mechanism
 - c. Shall be on major panels of: filter, control box, fan motor, and gas or electric heat controls.
8. Unit- Mounted, Non- Fused Disconnect Switch:
 - a. Switch shall be factory installed, internally mounted.
 - b. National Electric Code (NEC) and UL approved non- fused switch shall provide unit power shutoff.
 - c. Shall be accessible from outside the unit.
 - d. Shall provide local shutdown and lockout capability.
9. Unit Mounted Circuit Breaker:
 - a. Breaker shall be factory installed, internally mounted.
 - b. National Electric Code (NEC) and UL approved circuit breaker shall provide unit power shutoff and protect the unit in the event of a short-circuit.
 - c. Shall be accessible from outside the unit.

- d. Shall provide local shutdown and lockout capability.
10. Powered Convenience Outlet:
- a. Outlet shall be powered from main line power to the rooftop unit.
 - b. Outlet shall be factory installed and internally mounted with easily accessible 115- v female receptacle.
 - c. Outlet shall include 15 amp GFI receptacles with independent fuse protection.
 - d. Voltage required to operate convenience outlet shall be provided by a factory installed step- down transformer.
 - e. Outlet shall be accessible from outside the unit.
11. Modulating Power Exhaust:
- a. Power exhaust shall be used in conjunction with an integrated economizer.
 - b. Exhaust fans shall be of centrifugal blower design with dual exhaust fans.
 - c. Factory installed exhaust and field installed fold out exhaust shall achieve modulation of airflow from the use of ECM fan motors in conjunction with monitoring the static pressure differential between the building duct and outdoor ambient pressure.
 - d. Bolt on field installed exhaust shall achieve modulation of airflow from the use of a Variable Frequency Drive in conjunction with monitoring the static pressure differential between the building duct and outdoor ambient pressure.
 - e. Shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0- 100% adjustable set point on the economizer control.
 - f. Factory installed exhaust shall have built in fold out rain hood design to reduce installation time.
 - g. Field installed exhaust shall be either of same design as factory installed exhaust described above or of bolt on design, per customer selection.
12. Roof Curbs:
- a. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.
 - b. Permits installation and securing of ductwork to curb prior to mounting unit on the curb.
13. Dual Enthalpy Sensor:
- a. The dual enthalpy sensor option or kit shall provide 2 relative humidity sensors to be mounted in the return and outdoor air streams to provide dual enthalpy economizer control.
 - b. This kit contains all components required to dual enthalpy and does not need to be used in conjunction with the Single Enthalpy Sensor Kit.

14. Low Ambient Kit:
 - a. Shall contain an integrated low ambient controller to regulate condenser head pressure at low ambient temperatures by varying the amount of airflow through the condenser.
 - b. 15 and 17.5 ton models shall have a single controller while 20, 25, and 27.5 ton models shall have 2 controllers.
 - c. Shall allow units to operate in cooling mode down to 0° F outdoor ambient.
 - d. Shall be required when full mechanical cooling is required at temperatures below 40° F.

15. High SCCR:
 - a. Shall achieve short-circuit current rating of 65 kA on 208/230V and 460V units, and 25 kA on 575V units, an increase from the standard 5 kA rating.
 - b. All necessary electrical components and wiring are sized to achieve the high SCCR rating.
 - c. Provides additional protection to unit and equipment in the event of a short-circuit condition.

16. Condensate Overflow Switch:
 - a. Shall utilize float switch in condensate drain pan to signal if water level rises above acceptable threshold.
 - b. Switch shall detect a 0.25-inch rise above mounted location to determine need to send shutoff signal.
 - c. Shall send 24V signal to unit controller when tripped to shut down cooling operation and prevent additional buildup of water in condensate drain pan.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

- B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

- A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION 230250

SECTION 230265 - VARIABLE REFRIGERANT FLOW INDOOR UNITS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

- A. Indoor units are matched with heat pump or heat recovery VRF (variable refrigerant flow) outdoor unit. This specification is based on the unit as manufactured by LG. Equivalent units and manufacturers must meet all performance criteria and will be considered upon approval.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Units shall be stored and handled per unit manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 CEILING CASSETTE – 4 WAY

A. General

1. Unit shall be designed to be installed for indoor application.
2. Unit shall be designed to mount recessed in the ceiling and has a surface mounted grille on the bottom of the unit.
3. The unit shall be available in both nominal 2' x 2' and 3' x 3' chassis.

B. Casing/Panel

1. Unit case shall be manufactured using galvanized steel plate.
2. The unit panel shall be provided with an off-white or black Acrylonitrile Butadiene Styrene (ABS) polymeric resin grille.
3. The grille shall have a tapered trim edge, and a hinged, spring clip (screw-less) return air filter-grille door.
4. Unit shall be provided with metal ears designed to support the unit weight on four
5. Ears shall have pre-punched holes designed to accept field supplied all thread rod hangers.
6. Unit shall be supplied with snap off access panels to facilitate leveling of unit without removing the grille.

C. Cabinet Assembly

1. Unit shall have four supply air outlets and one return air inlet.

2. The supply air outlet shall be through four directional slot diffusers each equipped with independent oscillating motorized guide vanes designed to change the airflow direction.
3. The grille shall have a discharge range of motion of 40° in an up/down direction with capabilities of locking the vanes.
4. The unit shall have a guide vane algorithm designed to sequentially change the predominant discharge airflow direction in counterclockwise pattern.
5. Guide vanes shall provide airflow in all directions.
6. Unit shall be equipped with factory installed temperature thermistors for:
 - a. Return air
 - b. Refrigerant entering coil
 - c. Refrigerant leaving coil
7. Unit shall have a factory assembled, piped and wired electronic expansion valve (EEV) for refrigerant control.
8. Unit shall have a built-in control panel to communicate with other indoor units and to the outdoor unit.
9. The unit shall have factory designated branch duct knockouts on the unit case.
10. The unit shall have provision of fresh air ventilation through a knock-out on the cabinet.
11. The branch duct knockouts shall have the ability to duct up to 1/2 the unit airflow capacity.
12. The branch duct cannot be ducted to another room.
13. Unit shall have the following functions as standard:
 - a. Self-diagnostic function
 - b. Auto addressing
 - c. Auto restart function
 - d. Auto changeover function (Heat Recovery system only)
 - e. Auto operation function
 - f. Child lock function
 - g. Forced operation
 - h. Dual thermistor control
 - i. Sleep mode
 - j. Dual set point control
 - k. Multiple aux heater applications
 - l. Filter life timer
 - m. External on/off input
 - n. Wi-Fi compatible
 - o. Auto fan operation
 - p. Leak detection logic

D. Fan Assembly

1. The unit shall have a single, direct-drive turbo fan made of high strength ABS HT-700 polymeric resin.
2. The fan impeller shall be statically and dynamically balanced.
3. The fan motor is Brushless Digitally commutated (BLDC) with permanently lubricated and sealed ball bearings.
4. The fan motor shall include thermal, overcurrent and low RPM protection.
5. The fan/motor assembly shall be mounted on vibration attenuating rubber grommets.
6. The fan speed shall be controlled using microprocessor based direct digitally controlled algorithm that provides a minimum of four pre-programed fan speeds in the heating mode and fan only mode and five speeds in the cooling mode. The fan speed algorithm provides a field selectable fixed speed.
7. A field setting shall be provided to vary air throw pattern to compensate for high ceiling installations.
8. In cooling mode, the indoor fan shall have the following settings: Low, Med, High, Super high, Power Cool, and Auto.
9. In heating mode, the indoor fan shall have the following settings: Low, Med, High, Super high and auto.
10. Unit shall have factory installed motorized louver to provide flow of air in up and down direction for uniform airflow.

E. Filter Assembly

1. The return air inlet shall have a factory supplied removable, washable filter.
2. The unit shall have the capability to accept a field provided MERV 1 to MERV 10 filter.
3. The filter access shall be from the bottom of the unit without the need for tools.
4. The nominal 3'x3' cabinet unit shall have provision for an optional auto-elevating grille kit designed to provide motorized ascent/descent of the return air grille/pre filter assembly.
 - a. The ascent/descent of the return air grille shall be up to a distance of 14-3/4 feet allowing access to remove and clean the filter.
 - b. The auto-elevating grille shall have a control algorithm to accept up, down and stop control commands from the controller.
 - c. The auto-elevating grille shall have a control to stop the descent automatically if a contact is made with any obstacle.

F. Coil Assembly

1. Unit shall have a factory built coil comprised of aluminum fins mechanically bonded on copper tubing.
2. The copper tubing shall have inner grooves to expand the refrigerant contact surface for high efficiency heat exchanger operation.
3. Unit shall have a minimum one or two row coil 18-19 fins per inch.

4. Unit shall have a factory supplied condensate drain pan below the coil constructed of EPS (expandable polystyrene resin).
5. Unit shall include an installed and wired condensate drain lift pump capable of providing minimum 27.5 inch lift from bottom surface of the unit.
6. The drain pump shall have a safety switch to shut off the unit if condensate rises too high in the drain pan.
7. Unit shall have provision of 45° flare refrigerant pipe connections.
8. The coil shall be factory pressure tested at a minimum of 550 psig.
9. All refrigerant piping from outdoor unit to indoor unit shall be field insulated. Each pipe should be insulated separately. Thickness and heat transfer characteristics shall be determined by the design engineer and shall meet all code requirements
4. Safeties - The following safety devices shall be part of the condensing unit:
 - a. High pressure switch
 - b. Fuses
 - c. Crankcase heater
 - d. Fusible plug
 - e. Over current relay for the compressor
 - f. Thermal protectors for compressor and fan motor
 - g. Compressor time delay
 - h. Oil Recovery system
 - i. Oil level sensor
 - j. Over-current sensor
 - k. Compressor suction and discharge temperature sensor
 - l. Compressor suction and discharge pressure sensor

G. Microprocessor Control

1. The unit shall have a factory installed microprocessor controller capable of performing functions necessary to operate the system.
2. The unit shall be able to communicate with other indoor units and the outdoor unit using a field supplied minimum of 18 AWG, two core, stranded, twisted and shielded communication cable.
3. The unit controls shall operate the indoor unit using one of the five operating modes:
 - a. Auto changeover (Heat Recovery System only)
 - b. Heating
 - c. Cooling
 - d. Dry
 - e. Fan only
4. The unit shall be able to operate in either cooling or heating mode for testing and/or commissioning.
5. The unit shall be able to operate with the fan turned off during system cooling thermal off.
6. The unit shall have adjustable, multi-step cooling and heating mode thermal on/off temperature range settings.

7. The system shall include a product check function to access and display indoor unit type and capacity from a wired programmable thermostat controller.
8. Unit shall have a field settable method to choose auto fan speed change operation based on mode of operation, on/off fan operation based on mode of operation, or continuous minimum set fan speed operation.

H. Electrical

1. The unit electrical power shall be 208-230/1/60 (V/Ph/Hz).
2. The unit shall be capable of operating within voltage limits of +/- 10% of the rated voltage.

I. Controls: Unit shall use controls provided by the manufacturer to perform all functions necessary to operate the system effectively and efficiently and communicate with the outdoor unit over an RS-485 daisy chain.

J. Seismic Installations: Provide OSHPD Special Seismic Certification Preapproval (OSP) documents for certified product list of VRF equipment to be installed in high seismic risk areas. Provide LG supplemental installation documents in conformance with CBC 2013, 2016 and 2019 California Building Code and IBC 2012, 2015 and 2018 International Building Code.

K. Warranty: Please refer to the respective outdoor unit for applicable warranty.

2.2 WALL MOUNTED – STANDARD

A. General

1. Unit shall be designed to be installed for indoor application.
2. Unit shall be attached to an installation plate/bracket that secures unit to the wall.
3. The depth of the unit shall not exceed 8.25 inches.

B. Casing/Panel

1. Unit case shall be manufactured using Acrylonitrile Butadiene Styrene (ABS) polymeric resin and has a pearl white finish designed for mounting on a vertical surface and includes an installation mounting template and hanging bracket.

C. Cabinet Assembly

1. Unit shall have one supply air outlet and one return air inlet with a manual or motorized sweeping guide vane that automatically changes the direction of airflow from side-to-side and up-and-down.
2. Unit shall be equipped with factory installed temperature thermistors for:
 - a. Return air
 - b. Refrigerant entering coil
 - c. Refrigerant leaving coil

3. Unit shall have a factory assembled, piped and wired electronic expansion valve (EEV) for refrigerant control.
4. Unit shall have a built-in control panel to communicate with other indoor units and to the outdoor unit.
5. Unit shall have the following functions as standard:
 - a. Self-diagnostic function
 - b. Auto addressing
 - c. Auto restart function
 - d. Auto changeover function (Heat Recovery system only)
 - e. Auto operation function
 - f. Auto clean function
 - g. Child lock function
 - h. Forced operation
 - i. Dual thermistor control
 - j. Sleep mode
 - k. Dual set point control
 - l. Filter life timer
 - m. External on/off control input
 - n. Wi-Fi compatible
 - o. Auto fan operation
 - p. Leak detection logic
6. Unit shall be capable of refrigerant piping in four different directions.
7. Unit shall be capable of drain piping in two different directions.

D. Fan Assembly

1. The unit shall have a single, direct driven crossflow tangential Sirocco fan made of high strength ABS BSN-7530 polymeric resin.
2. The fan impeller shall be statically and dynamically balanced.
3. The fan motor is Brushless Digitally commutated (BLDC) with permanently lubricated and sealed ball bearings.
4. The fan motor shall include thermal, overcurrent and low RPM protection.
5. The fan/motor assembly shall be mounted on vibration attenuating rubber grommets.
6. The fan speed shall be controlled using microprocessor based direct digitally controlled algorithm that provides a minimum of three pre-programmed fan speeds in the heating mode and fan only mode and four speeds in the cooling mode. The fan speed algorithm provides a field selectable fixed speed.
7. In cooling mode, the indoor fan shall have the following settings: Low, Med, High, Power Cool, and Auto.
8. In heating mode, the indoor fan shall have the following settings: Low, Med, High, and Auto.

9. Unit shall have factory installed motorized louver to provide flow of air in up and down direction for uniform airflow.
10. Unit shall have factory installed motorized guide vane to control the direction of flow of air from side to side.

E. Filter Assembly

1. The return air inlet shall have a factory supplied removable, washable filter.
2. The unit shall have the capability to accept a field provided MERV 1 to MERV 10 filter.
3. The filter access shall be from the bottom of the unit without the need for tools.
4. The nominal 3'x3' cabinet unit shall have provision for an optional auto-elevating grille kit designed to provide motorized ascent/descent of the return air grille/pre filter assembly.
 - a. The ascent/descent of the return air grille shall be up to a distance of 14-3/4 feet allowing access to remove and clean the filter.
 - b. The auto-elevating grille shall have a control algorithm to accept up, down and stop control commands from the controller.
 - c. The auto-elevating grille shall have a control to stop the descent automatically if a contact is made with any obstacle.

F. Coil Assembly

1. Unit shall have a factory built coil comprised of aluminum fins mechanically bonded on copper tubing.
2. The copper tubing shall have inner grooves to expand the refrigerant contact surface for high efficiency heat exchanger operation.
3. Unit shall have a minimum one or two row coil 18-19 fins per inch.
4. Unit shall have a factory supplied condensate drain pan below the coil constructed of EPS (expandable polystyrene resin).
5. Unit shall include an installed and wired condensate drain lift pump capable of providing minimum 27.5 inch lift from bottom surface of the unit.
6. The drain pump shall have a safety switch to shut off the unit if condensate rises too high in the drain pan.
7. Unit shall have provision of 45° flare refrigerant pipe connections.
8. The coil shall be factory pressure tested at a minimum of 550 psig.
9. All refrigerant piping from outdoor unit to indoor unit shall be field insulated. Each pipe should be insulated separately. Thickness and heat transfer characteristics shall be determined by the design engineer and shall meet all code requirements.

G. Microprocessor Control

1. The unit shall have a factory installed microprocessor controller capable of performing functions necessary to operate the system.

2. The unit shall be able to communicate with other indoor units and the outdoor unit using a field supplied minimum of 18 AWG, two core, stranded, twisted and shielded communication cable.
3. The unit controls shall operate the indoor unit using one of the five operating modes:
 - a. Auto changeover (Heat Recovery System only)
 - b. Heating
 - c. Cooling
 - d. Dry
 - e. Fan only
4. The unit shall be able to operate in either cooling or heating mode for testing and/or commissioning.
5. The unit shall be able to operate with the fan turned off during system cooling thermal off.
6. The unit shall have adjustable, multi-step cooling and heating mode thermal on/off temperature range settings.
7. The system shall include a product check function to access and display indoor unit type and capacity from a wired programmable thermostat controller.
8. Unit shall have a field settable method to choose auto fan speed change operation based on mode of operation, on/off fan operation based on mode of operation, or continuous minimum set fan speed operation.

H. Electrical

1. The unit electrical power shall be 208-230/1/60 (V/Ph/Hz).
2. The unit shall be capable of operating within voltage limits of +/- 10% of the rated voltage.

I. Controls: Unit shall use controls provided by the manufacturer to perform all functions necessary to operate the system effectively and efficiently and communicate with the outdoor unit over an RS-485 daisy chain.

J. Seismic Installations: Provide OSHPD Special Seismic Certification Preapproval (OSP) documents for certified product list of VRF equipment to be installed in high seismic risk areas. Provide LG supplemental installation documents in conformance with CBC 2013, 2016 and 2019 California Building Code and IBC 2012, 2015 and 2018 International Building Code.

K. Warranty: Please refer to the respective outdoor unit for applicable warranty.

2.3 FAN COIL DUCTED – HIGH STATIC

A. General

1. Unit shall be designed to be installed for indoor applications.
2. Ducted high Static- Unit shall be a low profile design with a maximum height of twelve inches.

3. Unit shall be designed to mount fully concealed above the finished ceiling.
4. Unit shall have opening to supply air from front horizontal and a dedicated rear horizontal return.
5. The supply air shall be flanged for field installed ductwork that shall not exceed the external static pressure limitation of the unit.

B. Casing/Panel

1. Unit case shall be manufactured using galvanized steel plate.
2. The cold surfaces of the unit shall be covered internally with a coated polystyrene insulating material.
3. Unit shall be provided with hanger brackets designed to support the unit weight on four corners.
4. Hanger brackets shall have pre-punched holes designed to accept field supplied, all thread rod hangers.

C. Cabinet Assembly

1. Unit shall have horizontal supply air discharge outlets and a return air inlet
2. Unit shall be equipped with factory installed temperature thermistors for:
 - a. Return air
 - b. Refrigerant entering coil
 - c. Refrigerant leaving coil
3. Unit shall have a factory assembled, piped and wired electronic expansion valve (EEV) for refrigerant control.
4. Unit shall have a built-in control panel to communicate with other indoor units and to the outdoor unit.
5. Unit shall have the following functions as standard:
 - a. Self-diagnostic function
 - b. Auto addressing
 - c. Auto restart function
 - d. Auto changeover function (Heat Recovery system only)
 - e. Auto operation function
 - f. Child lock function
 - g. Forced operation
 - h. Dual thermistor control
 - i. Sleep mode
 - j. External static pressure (ESP) control
 - k. Dual set point control
 - l. Multiple aux heater applications
 - m. Filter life timer
 - n. External on/off input
 - o. Wi-Fi compatible
 - p. Auto fan operation
 - q. Leak detection logic

D. Fan Assembly

1. The unit shall have two direct drive Sirocco fans made of high strength ABS GP-2200 polymeric resin.
2. The fan impeller shall be statically and dynamically balanced.

3. The fans shall be mounted on a common shaft.
4. The fan motor is Brushless Digitally Commutated (BLDC) with permanently lubricated and sealed ball bearings.
5. The fan motor shall include thermal, overcurrent and low RPM protection.
6. The fan/motor assembly shall be mounted on vibration attenuating rubber grommets.
7. The fan speed shall be controlled using microprocessor based direct digitally controlled algorithm that provides a minimum of three pre-programed fan speeds, each setting is also adjustable by field setting to compensate for a limited amount of additional resistance to airflow by adjusting the RPM of the fan motor.
8. In cooling mode, the indoor fan shall have the following settings: Low, Med, High, and Auto.
9. In heating mode, the indoor fan shall have the following settings: Low, Med, High, and Auto.
10. Each of the settings can be field adjusted from the factory setting (RPM/ESP).
11. Unit shall be designed for high speed air volume against an external static pressure of up to 0.98", model dependent.

E. Filter Assembly

1. The return air inlet shall have a factory supplied accessory MERV 13 filter rack.
2. The filter access shall be from the side of the unit.

F. Coil Assembly

1. Unit shall have a factory built coil comprised of aluminum fins mechanically bonded on copper tubing.
2. The copper tubing shall have inner grooves to expand the refrigerant contact surface for high efficiency heat exchanger operation.
3. Unit shall have a minimum two to three row coil, 18-21 fins per inch.
4. Unit shall have a factory supplied condensate drain pan below the coil constructed of HIPS (high impact polystyrene resin).
6. Unit shall include an installed and wired condensate drain lift pump capable of providing minimum 27.5 inch lift from bottom surface of the unit. The unit drain pan is supplied with a secondary drain port/plug allowing the pan to be gravity drained and serviced.>
7. The drain pump shall have a safety switch to shut off the unit if condensate rises too high in the drain pan, model dependent.
8. Unit shall have provision of 45° flare refrigerant pipe connections.
9. The coil shall be factory pressure tested at a minimum of 550 psig.
10. All refrigerant piping from outdoor unit to indoor unit shall be field insulated. Each pipe should be insulated separately. Thickness and heat transfer characteristics shall be determined by the design engineer and shall meet all code requirements.

G. Microprocessor Control

1. The unit shall have a factory installed microprocessor controller capable of performing functions necessary to operate the system with or without the use of a wall mounted controller. The unit shall have a factory mounted return air thermistor for use as a space temperature control device. All operating parameters except scheduling shall be stored in non-volatile memory resident on the microprocessor. The microprocessor shall provide the following functions, self-diagnostics, auto re-start after a power failure and a test run mode.
2. The unit shall be able to communicate with other indoor units and the outdoor unit using a field supplied minimum of 18 AWG, two core, stranded, twisted, and shielded communication cable (RS-485). The unit shall be able to communicate with the BMS system. Provide all software and hardware as required.
3. The unit controls shall operate the indoor unit using one of the five operating modes:
 - a. Auto changeover (Heat Recovery System only)
 - b. Heating
 - c. Cooling
 - d. Dry
 - e. Fan only
4. The unit shall be able to operate in either cooling or heating mode for testing and/or commissioning.
3. The unit shall be able to operate with the fan turned off during system cooling thermal off.
4. The unit shall be able to operate with a continuous fan setting.
5. The unit shall have adjustable, multi-step cooling and heating mode thermal on/off temperature range settings.
6. The system shall include a product check function to access and display indoor unit type and capacity from a wired programmable thermostat controller.

H. Electrical

1. The unit electrical power shall be 208-230/1/60 (V/Ph/Hz).
 - a. The unit shall be capable of operating within voltage limits of +/- 10% of the rated voltage.

2.4 Multi V Heat Recovery Units:

A. General

1. Unit shall be designed to be installed for indoor application.
2. Heat recovery units have two (2), three (3), four (4), six (6), or eight (8) ports for connections to indoor units. Each port is capable of connecting from one (1) indoor unit up to eight (8) indoor units up to a maximum nominal capacity of ≤ 60 MBh. When multiple indoor units are connected to one port, all indoor units on that port must operate in the same mode (cooling or heating). Individual indoor units ≥ 60 MBh nominal capacity must use two (2) neighboring heat recovery unit ports twinned together using a reverse Y-branch kit. Connect largest indoor unit to first port of the heat recovery unit. Each heat recovery unit can support a maximum capacity (sum of ports) of up to 230 MBh.

3. Heat recovery ports can operate in heating or cooling mode independently, regardless of the mode of any other port on the unit or in the system except where heat recovery unit ports are twinned. Heat recovery units contain one double spiral subcooling heat exchanger per port, are internally insulated, and do not require a condensate drain.

B. Casing and Construction

1. Heat recovery units are completely factory assembled, internally piped, wired, and are designed for indoor installation.
2. Casing is constructed of galvanized steel, and houses piping, valves and controls to divert refrigerant controlling each port to operate in either heating or cooling mode.
3. Heat recovery units contain one double spiral subcooling heat exchanger per port, are internally insulated, and do not require a condensate drain.

C. Refrigerant Valves

1. Each heat recovery port is circuited with two two-position motorized valves to control R410A refrigerant flow path to allow indoor units to operate in heating or cooling mode.

D. Refrigerant Piping

1. Units can be piped in series and / or parallel to optimize cost between material and labor. Up to 16 heat recovery units can be piped in series, parallel, or a combination of series and parallel to optimize cost between material and labor. Any series string of heat recovery ports/units can connect up to 230 MBh of indoor unit nominal capacity (series string is defined as heat recovery units piped in series). Heat recovery unit piping limitations also depend on the allowable piping parameters of the outdoor unit installed.
 - a. Indoor units up to 131 equivalent feet of piping length from the heat recovery unit to which it is connected.
 - b. Indoor units up to 295 equivalent feet of piping length from the first branch.
 - c. Difference between highest and lowest elevation indoor units piped to separate parallel heat recovery units (HRUs) up to 131 feet in elevation.
 - d. Difference between highest and lowest heat recovery units piped in parallel up to 98 feet in elevation.
 - e. Difference between highest and lowest elevation heat recovery units piped in series up to 16 feet in elevation.
 - f. Elevation difference of series connected heat recovery units cannot exceed 16 feet.
2. All refrigerant lines from the outdoor unit to the heat recovery units, and from the heat recovery units to the indoor units must be field insulated separately.

E. Electrical

1. Heat recovery units require 208-230V, 1-phase, 60 Hz electrical power.

2. Units are capable of operation within $\pm 10\%$ of nominal voltage.

F. Controls

1. Heat recovery units include factory-installed control boards with integral microprocessors. Heat recovery unit control boards communicate with the main control board in the outdoor unit and interface with the VRF equipment controls system. The control circuit between the indoor units, heat recovery units and the outdoor unit is RS-485 daisy chain communication over two-conductor, twisted, stranded, shielded, 18 AWG cable.

2.5 VERTICAL / HORIZONTAL AIR HANDLER

A. General

1. Unit shall be designed to be installed for indoor applications.

B. Casing

1. The unit is designed to operate in the vertical up flow configuration or horizontal left end supply air.
2. Return air opening is on the bottom in the vertical position or right end in the horizontal position.
3. Return air plenum sub-base is to be field provided.
4. The supply air connection is male flange.
5. The unit case is made of 22-gauge coated metal and the external surfaces are finished with a high gloss baked enamel finish.
6. Finish color is "morning fog" (medium beige).
7. Cold surfaces are galvanized steel. The cold surfaces of the case are internally insulated with $\frac{1}{2}$ inch foil faced, polystyrene fiber insulation.
8. The inside surface of the fan assembly door access panel is treated with $\frac{1}{2}$ inch polystyrene fiber insulation, encapsulated on both sides, and sealed along the edges with a reinforced foil-faced covering to prevent deterioration caused by panel removal.
9. All access panels are provided with gasket seals to minimize air leakage.
10. The unit case is designed to accept an internal, optional, LG electric strip heater.
11. The unit bears the ETL label.
12. Unit breaker, fuses, and / or disconnect are provided by others.

C. Fan Assembly and Control

1. The indoor unit has an integral fan assembly consisting of a galvanized steel housing and a forward-curved fan wheel.
2. The direct drive fan/motor assembly is mounted on rubber grommets. isolating the rotating assembly from the fan housing.
3. The fan motor is a Brushless Digitally Controlled design (BLDC), having permanently lubricated and sealed ball bearings.
4. The fan motor includes thermal, overcurrent and low RPM protection.
5. The fan/motor assembly is mounted on vibration attenuating rubber grommets.
6. The fan impeller is statically and dynamically balanced.

7. Fan speed is controlled using a microprocessor-based direct digital control algorithm that provides a minimum of a high fan speed in cooling thermal ON and low fan speed in cooling thermal OFF, high fan speed in heating thermal ON and fan off in heating thermal OFF.
8. The fan speeds can be field adjusted between low, medium, and high speeds and DIP switch settings will allow the fan to run constantly during defrost or oil return modes. Each setting can be field adjusted from the factory setting (RPM/ESP). The setting provides delivery of the high speed air volume against an external static pressure of up to 1.0 in-wg.

D. Air Filter

1. The unit comes with a filter rack capable of accepting a field- provided 16" x 20" x 1" (NJ chassis) or 24" x 20" x 1" (NK chassis) filter cartridge. The filter rack is equipped with guides that keep the filter centered in the rack. Filter service access is from the front of the unit without removing the coil or fan area access panels. Filter access door is provided with thumb screws that can be removed.

E. Microprocessor Controls

1. The unit is equipped with an integrated microprocessor-based controller capable of performing functions necessary to operate the system without the use of a wall-mounted controller. A temperature thermistor is mounted in the return air stream. All unit operating parameters, excluding the operation schedule, are stored in non-volatile memory resident on the unit microprocessor.
2. Operating schedules are stored in select models of the optional wall-mounted local or central controller. The field-supplied communication cable between the indoor unit(s) and outdoor unit is to be a minimum of 18 AWG, 2 conductor, stranded, and shielded (RS-485).
3. The microprocessor control provides the following functions: auto addressing, self-diagnostics, auto restart following power restoration, and will operate the indoor unit using one of the following five operation modes:
 - a. Auto Changeover (Heat Recovery only)
 - b. Heating
 - c. Cooling
 - d. Dry
 - e. Fan Only
4. For Heat Recovery systems the Auto Changeover setting automatically switches control of the indoor unit between cooling and heating modes based on space temperature conditions.
5. For Heat Pump systems, heated or cooled air delivery is dependent upon outdoor unit operating mode.
6. In Heating mode, the microprocessor control does not begin fan operation until coil pipe temperature reaches 76°F. Significant airflow is generated when pipe temperature reaches 80°F. A field-selectable option maintains fan operation for 30 minutes following cooling cycle operations.
 - a. Wall-mounted wire controller
 - b. Factory-mounted return air thermistor or the optional wall mounted wired remote temperature sensor.

7. The microprocessor controls space temperature using the value provided by the temperature sensor sensing a space temperature that is farthest away from the temperature set-point. A single indoor unit has the capability of being controlled by up to two local wired controllers. The microprocessor control provides a cooling or heating mode test cycle that operates the unit for 18 minutes without regard to the space temperature. If the system is provided with an optional local or central controller, displayed diagnostic codes are specific and provide the service technician with the reason for the code displayed.

F. Handling Condensate

1. The drain pan is designed to work with a gravity building drain system. If condensate lifts/pumps are needed, they are to be field provided. A secondary drain port plug is provided allowing the pan to be drained for service. Condensate float safety switch connections are available on the main control board for connection of a field supplied float safety switch.

G. Condensate Drain Pan

1. The condensate drain pan is constructed of HIPS (high impact polystyrene resin).

H. Coil

1. The indoor unit coil is constructed with grooved design copper tubes with slit coil fins, 2 to 3 rows, 18 fins per inch.

I. Controls Features

1. Auto changeover (Heat Recovery only)
2. Auto operation
3. Auto restart
4. External on / off control
5. Dual thermistor control
6. External static pressure control
7. Group control
8. Hot start
9. Self diagnostics
10. Timer (on / off)
11. Weekly schedule
12. Fan speed control
13. Dual set-point control
14. Filter life display
15. Multiple auxiliary heater applications
16. Wi-Fi compatible
17. Auto fan
18. Leak detection

2.6 BMS INTEGRATION:

- A. The VRF system shall be able to integrate with Building Management Systems via BACnet™ IP gateway. This gateway converts between BACnet™ IP or Modbus TCP protocol, and RS-485 LGAP (LG Aircon protocol) allowing third party control and monitoring of the LG A/C system, or LonWorks™ gateways. See controls specification for points list. The VRF vendor shall allocate time to work with the ATC contractor for successful integration.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories, and components.
- B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed, and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

- A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt, and other foreign substances.

END OF SECTION 230265

SECTION 230266 - VARIABLE REFRIGERANT FLOW OUTDOOR UNITS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

- A. Indoor units or outdoor air handling units are matched with heat pump or heat recovery VRF (variable refrigerant flow) outdoor unit.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Unit shall be ETL listed and certified to UL 1995 4th edition standard.

PART 2 - PRODUCTS

2.1 HEAT RECOVERY AND HEAT PUMP SYSTEMS

A. Product Design

1. LG Multi V heating and cooling system shall be an air cooled system allowing user to configure in the field a heat pump or a heat recovery system consisting of one to three outdoor unit modules, conjoined to make a 2-5 ton single refrigerant circuit for the Multi V S system, and 6-42 single refrigerant circuit for the Multi V 5 system.
 - a. Heat recovery systems, employing three pipes, shall be connected to Heat recovery (heat recovery) unit(s) and indoor unit(s). Multi-port heat recovery units shall allow simultaneous heating and cooling of individual zone(s) at various capacities as required to satisfy their zone requirements.
 - b. Heat pump systems shall require two pipes, simultaneous heating and cooling shall not be supported. The heat recovery system shall consist of three pipes, liquid, suction and hot gas pipes. Heat recovery systems operating at 0°F that cannot deliver single phase superheated refrigerant vapor at a minimum of 162°F while operating in the heating mode shall not be acceptable.
2. All three-phase VRF heat pump and heat recovery outdoor units shall be from the same product development generation. Mixing of outdoor units from different development generations is not acceptable.

B. Operating Conditions

1. Outdoor Unit shall be capable of continuous compressor operation between the following operating ambient air conditions, operation outside of these conditions are possible and may involve non-continuous operations.

2. Operating Ambient Air Conditions
 - a. Cooling: 5°F DB to 122°F DB (With optional low ambient kit from -9.9°F DB to 122°F DB)
 - b. Heating: -22°F WB to 61°F WB
 - c. Cooling Based (ODU reversing valve in cooling position) Synchronous: 14°F DB to 81°F DB (Heat Recovery Operation Only)
 - d. Heating Based (ODU reversing valve in heating position) Synchronous: 14°F WB to 61°F WB (Heat Recovery Operation Only)

C. Electrical

1. All air source heat pump and heat recovery frame(s) shall be designed and electrically protected to maintain stable continuous compressor operation when provided with 460/60/3 or 208-230/60/3 power with the following specifications:
 - a. 460/60/3
 - i. Voltage tolerance 414V
 - b. 208-230/60/3 power and can withstand a voltage fluctuation of $\pm 10\%$
 - i. Voltage tolerance between 187V to 253V
 - c. Voltage imbalance of up to two percent;
 - d. Power surge of up to 5kA RMS Symmetrical.

D. General Features

1. The air-conditioning system shall use R410A refrigerant.
2. Each system shall consist of one, two or three air source outdoor unit modules conjoined together in the field to result in the capacity specified elsewhere in these documents.
3. Dual and triple frame configurations shall be field piped together using manufacturer's designed and supplied Y-branch kits and field provided interconnecting pipe to form a common refrigerant circuit.
4. System shall have following frame configurations vs. capacity.
2 to 20 ton units shall be a single frame only.
22 to 34 ton units shall be dual frame only.
36 to 42 ton heat recovery units shall be triple frame only
5. System shall employ self-diagnostics function to identify any malfunctions and provide type and location of malfunctions via fault alarms.
6. All outdoor units, regardless of the Heat Pump or Heat Recovery models, shall be the same generation and provide with most up to date firmware version at the time of delivery. Manufacturers commissioning agents shall assure the owner in the commissioning report that the latest software version.
7. If the specifications include both heat pump and heat recovery outdoor models, the manufacturer shall provide the most recent generation equipment only. Old stock or obsolete models will not be accepted. Products purchased over the internet and not from the manufacturer's authorized local mechanical representative or authorized distributor will not be accepted.

8. Field Provided Refrigerant Piping:

- a. The refrigerant circuit shall be constructed using field provided ACR copper, de-hydrated, refrigerant rated copper pipe, piped together with manufacturer supplied Heat recovery unit(s) and Y- branches, as may be required, connected to multiple (ducted, non-ducted or mixed combination) indoor units to effectively and efficiently control the heat pump operation or simultaneous heating and cooling operation of the heat recovery VRF system. Other pipe materials, if used, shall perform, at a minimum, as well as that specified above, shall not have any adverse reactions, for example galvanic corrosion, to any other components or materials also in use in the system and shall be installed per manufacturer's instructions.
- b. The unit shall be shipped from the factory fully assembled including internal refrigerant piping, inverter driven compressor(s), controls, temperature sensor, humidity sensor, contacts, relay(s), fans, power and communications wiring as necessary to perform both Heat Pump and Heat recovery operations.
- c. Each outdoor unit refrigeration circuit shall include, but not limited to, the following components:
 - i. Refrigerant strainer(s)
 - ii. Check valve(s)
 - iii. Inverter driven, medium pressure vapor injection, high pressure shell compressors
 - iv. Liquid refrigerant cooled inverter PCB
 - v. Oil separator(s)
 - vi. Accumulator /controlled volume receiver(s)
 - vii. 4-way reversing valve(s)
 - viii. Vapor injection valve(s)
 - ix. Variable path heat exchanger control valve(s)
 - x. Oil balancing control
 - xi. Oil Level sensor(s)
 - xii. Electronic expansion valve(s)
 - xiii. Double spiral tube sub-cooler (s) and EEV
 - xiv. Vapor Injection Valve(s)
 - xv. High and low side Schrader valve service ports with caps
 - xvi. High/low Service valves
 - xvii. Threaded fusible plug
 - xviii. High pressure switch

9. Field Insulation:

- a. All refrigerant pipe, y-branches, elbows and valves shall be individually insulated with no air gaps. Insulation R-value (thickness) shall not be less than the minimum called for by the local building code, local energy code

or as a minimum per manufacture installation requirements. In no case shall the insulation be allowed to be compressed at any point in the system.

- i. All joints shall be glued and sealed per insulation manufactures instructions to make an air-tight assembly.

10. Microprocessor:

- a. Factory installed microprocessor controls in the outdoor unit(s), heat recovery unit(s), and indoor unit(s) shall perform functions to optimize the operation of the VRF system and communicate in a daisy chain configuration between outdoor unit and heat recovery unit(s) and indoor unit(s) via RS485 network. Controls shall also be available to control other building systems as required from the VRF control system. DIO/AIO capabilities shall be available as well as a central controller to perform operation changes, schedules and other duties as required by this specification. Addition of separate building control system shall not be required. Other control devices and sequences shall be as specified in other sections of this project specification.

11. Inverter PCB Cooling:

- a. Cooling of the inverter PCB shall be conducted by way of high pressure, sub-cooled liquid refrigerant via heat exchanger attached to the inverter PCB. The full capacity flow of refrigerant shall pass through the heat exchangers to maximize the cooling effect of the PCBs and to aid in the evaporation process and capacity of the outdoor coil during the heating mode. The recovered heat of the PCBs must be used to enhance the overall heating process, other uses or dissipation of heat to ambient shall not be permitted.

12. Compressor Control:

- a. Fuzzy control logic shall establish and maintain target evaporating temperature (T_e) to be constant on cooling mode and condensing temperature (T_c) constant on heating mode by Fuzzy control logic to ensure the stable system performance.

13. Initial Test Run (ITR) (Heating or Cooling) / Fault Detection Diagnosis (FDD) Code:

- a. This control mode shall monitor and display positive or negative results of system initial startup and commissioning. Heating or Cooling ITR mode will be automatically selected. It shall monitor and provide performance metrics for the following, but not be limited to, refrigerant quantity charge, auto-charge, stable operations, connection ratios, indoor unit status, error status, and number of indoor units connected. This control mode shall not replace the system error monitoring control system.

14. BMS Integration:
 - a. The VRF system shall be able to integrate with Building Management Systems via BACnet™ IP gateway. This gateway converts between BACnet™ IP or Modbus TCP protocol, and RS-485 LGAP (LG Aircon protocol) allowing third party control and monitoring of the LG A/C system, or LonWorks™ gateways. See controls specification for points list. The VRF vendor shall allocate time to work with the ATC contractor for successful integration.

15. Wi-Fi Communication:
 - a. The outdoor unit shall be Wi-Fi enabled and capable. Wi-Fi shall allow service or maintenance personal access to the complete operating system, via LGMV mobile, without need of tools other than smart phone or tablet. Active live system review, collection of all system data for a field determined duration presented in a .csv file format or collection of all operating conditions, including all indoor units, valves, sensors, compressor speeds, refrigerant pressures, etc., by snapshot of conditions and placing that snapshot into a power point slide to be reviewed at another time. Systems that require computers, hard wire only connection or other devices to collect, review or record operating conditions shall not be allowed.

16. Indoor Unit Connectivity:
 - a. The system shall be designed to accept connection up to 64 indoor units of various configuration and capacity, depending on the capacity of the system.

17. Power and Communication Interruption:
 - a. The system shall be capable of performing continuous operation when an individual or several indoor units are being serviced; communication wire cut or power to indoor unit is disconnected. Systems that alarm and/or shut down because of a lack of power to any number of indoor units shall not be acceptable.

18. Connection Ratios:
 - a. The maximum allowable system combination ratio for all VRF systems shall be 130% and the minimum combination ratio shall be 50%.

19. Comfort Cooling Mode:
 - a. Comfort cooling shall be initiated via a field setting at the outdoor unit during commissioning or anytime thereafter. Comfort cooling shall allow user to select all or some of the zones on a system to adjust automatically their evaporator temperatures, independent of other zones, based on the impending total loads of that zone determined by using the zone controller temperature sensor.

20. The outdoor unit refrigerant circuit shall employ for safety a threaded fusible plug.
21. Refrigerant Flow Control
- a. An active refrigerant control and multi section accumulator-receiver that dynamically changes the volume of refrigerant circulating in the system based on operating mode and operating conditions to ensure maximum system performance and efficiency.
 - b. Subcooler: The VRF outdoor unit shall include a factory provided and mounted sub-cooler assembly consisting of a shell and tube-type sub-cooling heat exchanger and EEV providing refrigerant sub-cooling modulation control by fuzzy logic of EEV and by mode of operation to provide capacity and efficiency as required. Brazed plate heat exchangers shall not be allowed for this function.
 - c. Smart Load Control: The air source unit shall be provided with Smart Load Control (SLC) enhanced energy saving algorithm that reduces compressor lift during off peak operation. Smart load control operation shall enhance energy savings and increase indoor comfort by monitoring the real time ambient temperature, real time weighted mean average building load, and the outdoor relative humidity (if enabled).
 - i. The SLC algorithm shall be monitoring in real time, the rate of change of the outdoor ambient air temperature, either the outdoor ambient air relative humidity or the indoor air relative humidity [field selectable], and the rate of change of the building load.
 - ii. The SLC algorithm shall foresee pending changes in the building load, outdoor temperature and humidity (or indoor humidity) and proactively reset head and/or suction pressure targets in anticipation of the reduction/increase in building load.
 - iii. The SLC algorithm shall provide no fewer than 3 field selection options to maximize the control of the VRF system operation during morning warm-up or cool-down following night-setback reset. The selection shall be set by the commissioning agent (or at any other time thereafter). Selectable algorithm choices include:
 - 1. Maximize energy savings
 - 2. Balance the rate of temperature change with energy consumed.
 - 3. Quickly cool/heat the building.
22. Refrigerant Volume Management
- a. Active Refrigerant Charge
 - i. The VRF system shall be able to operate at any and all published conditions year round in cooling or heating mode without the need of adding or removing refrigerant from the system.
 - ii. The air source unit shall be provided with an isolated vessel to store spare refrigerant and actively pass refrigerant to (or from) the accumulator in real time as necessary to maintain stable refrigeration cycle operation.

- iii. The air source unit microprocessor shall be provided with an algorithm that monitors the VRF system head pressure, suction pressure, subcooling, superheat, compressor speed, high and low side temperatures and the load on the system to adjust the volume of refrigerant actively circulating.
 - b. Manual Seasonal Refrigerant Charge Adjustments
(Applicable for VRF systems without Active Refrigerant Charge)
 - i. Alternates: Systems that CANNOT passively and automatically modify the active refrigerant charge using the method(s) stated to maintain stable cycle operation shall clearly state so in bold capital letters in the proposal. VRF systems that cannot perform active refrigerant control may submit a proposal as an Alternate and must include as part of the equipment price the cost of to provide bi-annual refrigerant charging services for 15 years. Service shall be performed by the factory authorized agent only. Service shall include refrigerant, parts, labor, and fees necessary to analyze the current state of the system and perform the refrigerant charge adjustment. Service must occur one month before the winter season and one month before the summer season.
 - ii. If the VRF system requires a charge adjustment more frequently to maintain stable operation, the VRF manufacturer shall provide additional services at no additional charge.
 - iii. The 15 year period shall begin on the date the equipment is commissioned or the date the building occupancy permit was issued for the area(s) served by the system – whichever date is later.
 - iv. This service shall be underwritten, warranted, and administered by the VRF equipment manufacturer – not the local distributor or applied representative.
 - v. The selected service provider shall be mutually agreeable between the building owner (or owners agent) and must be licensed, insured, and trained to work on the VRF system. No third party service (subcontracted service) providers will be acceptable.
 - vi. If the service provider is not an employee of the VRF manufacturer, the service provider shall be reimbursed for services rendered directly from the manufacturer. Labor rate for services shall be paid at the prevailing wage rate in place at the time of service.
23. VRF Systems with Onboard Alternate Operating Mode Selection Capability
- a. All VRF systems which provide field selectable Alternate Operating Modes, for example, High Heat or High Ambient Cooling, published data tables must be available to the public for all modes offered.
 - b. Acceptable Alternate Operating Modes must ship with all models of the VRF product offering and must be factory embedded. Custom factory or field modifications to factory provided algorithms created to meet scheduled requirements are not acceptable.

- c. Provide a copy of instructions required to set the Alternate Operation Mode with the initial submittal.
- d. For systems that provide field selectable Alternate Operating Modes, ALL technical data provided in the submittal data sheets showing product rated condition performance data, must also provide separate data sheets that show product performance data at each of the field selectable Alternate Operating Modes available. Capacity, power input, and acoustic performance data for each mode offered shall be reported separately. Mixing of ODU, IDU, or VRF system performance capability operating in one mode with for example the power consumption, sound power rating, or electrical requirements of the same system operating in another mode is not acceptable.

E. Field Supplied Refrigerant Piping Design Parameters

1. The outdoor unit shall be capable of operating at an elevation difference of up to 360 feet above or below the lowest or highest indoor unit respectively without the requirement of field installed subcooler or other forms of performance enhancing booster devices for the Multi V 5 Series, and 164 feet above or 131 feet below for Multi V S Series.
2. The outdoor unit shall be capable of operating with up to 3280 for the Multi V 5 Series and 984 for the Multi V S Series equivalent length feet of interconnecting liquid line refrigerant pipe in the network.
3. The outdoor unit shall be capable of operating with up to 656 actual feet for the Multi V 5 Series and 592 actual feet for the Multi V S Series or 738 equivalent length feet for the Multi V 5 Series and 574 equivalent length feet for the Multi V S Series of liquid line refrigerant pipe spanning between outdoor unit and farthest indoor unit.
4. The piping system shall be designed with pipe expansion and contraction possibilities in mind. Required expansion devices shall be field designed, supplied and installed based on proper evaluation of the proposed piping design. In addition to these requirements, the piping system installation must conform to the VRF equipment manufacturer's published guidelines.
5. The installation of pipe hangers, supports, insulation, and in general the methods chosen to attach the pipe system to the structure must allow for expansion and contraction of the piping system and shall not interfere with that movement.
6. The elevation difference between indoor units on heat pump systems shall be 131 feet for the Multi V 5 Series and 49 feet for the Multi V S Series.
7. The elevation differences for heat pump systems shall be:
 - a. Heat recovery unit to connected indoor unit shall be 49 feet
 - b. Heat recovery unit to heat recovery unit shall be 98 feet
 - c. Indoor unit to indoor unit connected to same heat recovery unit shall be 49 feet
 - d. Indoor unit to indoor unit connected to separate parallel piped heat recovery units shall be 131 feet.
8. The acceptable elevation difference between two series connected heat recovery units shall be 16 feet.

F. Defrost Operations

1. The outdoor unit(s) shall be provided with a minimum of 4 independent field adjustable defrost cycle algorithms to maximize the effectiveness of the defrost cycle to the local weather conditions. Intelligent Defrost shall melt accumulated frost, snow and ice from the outdoor unit heat exchanger. The defrost cycle length and sequence shall be based on outdoor ambient temperatures, outdoor unit heat exchanger temperature, and various differential pressure variables. Intelligent Heating Mode, when outdoor unit humidistat is engaged, shall extend the normal heating sequences by adjusting the outdoor unit coil target temperature to be above the ambient dew point temperature delaying the need for defrost operations, so long as heating demand is being met.
2. Smart Heating: This feature shall be capable of eliminating several defrost actions per day based on outdoor air temperature and humidity conditions. Smart heating shall extend the heating operation cycle by delaying the frost formation on the outdoor coil by adjusting the surface temperature to keep it above the current outdoor ambient dew point. The algorithm shall delay while maintaining indoor space temperature.
3. Defrost Mode Selection: The outdoor unit shall be provided with a minimum of three field selectable defrost operation modes: Normal, Fast, or Forced.
 - a. Normal Defrost: Operation intended for use in areas of the country that experience adverse winter weather with periods of heavy winter precipitation and extremely low temperatures. This strategy shall maximize the systems heating performance and maintain operational efficiency. When the ambient temperature is either: a) above 32°F or b) below 32°F with the humidity level below 60% RH, Intelligent Defrost shall continue heating regardless of ice build-up on the coil until the quality of the heated air (i.e., discharge air temperature) decreases. At temperatures below 4°F, a defrost cycle shall occur every two hours to optimize system heating efficiency.
 - b. Fast Defrost: Operation intended for use in areas of the country with mild winter temperatures and light to moderate humidity levels. The strategy minimizes defrost cycle frequency allowing frozen precipitation to build longer in between cycles. Minimum time between defrost cycles shall be 20 minutes. Intelligent Defrost shall choose between split coil/frame and full system methods based on current weather conditions to minimize energy consumption and maximize heating cycle time.
 - c. Forced Defrost: Operation shall be available for the service provider to test defrost operations at any weather condition and to manually clear frozen water from the outdoor coil surfaces.
4. Defrost Method Selection: The outdoor unit shall be provided with two field selectable defrost operation methods: Split Coil/Frame and Full System. Split Coil/Frame option provides continuous heating of the occupied space during defrost operation.
 - a. Split Coil/Frame method shall be available when Normal Defrost mode is selected. Split Coil method shall be available on all Heat Pump and Heat recovery single-frame VRF systems. Split Frame defrost shall be available on all Heat Pump and Heat recovery multi-frame outdoor units.

- b. Split Coil method shall remove ice from the bottom half of the outdoor unit coil first for a maximum time of six minutes, then the top half for a maximum of six minutes. Next the bottom coil shall be heated again for an additional three minutes to remove any frozen water that may have dripped onto the lower coil during the top coil defrost operation.
 - c. When Split Coil/Frame method is selected, a Full System defrost shall occur every 1-9 (field selectable) defrost cycles to assure 100% of the frozen precipitation has been removed to maintain efficient performance.
 - d. Full System method shall be available as a field selectable option. All outdoor units located in areas of the country where large volumes of frozen precipitation are common, the commissioning agent shall be able to select the Full System only defrost method.
5. Indoor Unit Fan Operation During Defrost
- a. During partial defrost operation indoor units operating in cooling or dry mode shall continue normal operation.
 - b. During partial defrost operation, indoor units that are commissioned with fans set for continuous operation shall maintain normal fan speed unless the leaving air temperature drops, then the fan speed will be reduced to low speed for the remainder of the defrost cycle.
 - c. During full system defrost operation indoor unit fans will cycle off and remain off during the remainder of the defrost cycle.

G. Oil Management

1. The system shall utilize a high pressure oil return system to ensure a consistent film of oil on all moving compressor parts at all points of operation. Oil is returned to compressor through a separate high pressure oil injection pipe directly into the oil sump. Oil returned to the compressor via the suction port of the compressor shall not be allowed.
2. Each compressor shall be provided with a high efficiency independent centrifugal cyclone type oil separator, designed to extract oil from the oil/refrigerant gas stream leaving the compressor.
3. The system shall have an oil level sensor in the compressor to provide direct oil level sensing data to the main controller. The sensor shall provide data to main outdoor unit PCB to start oil return mode and balance oil levels between multiple compressors.
4. The system shall only initiate an oil return cycle if the sensed oil level is below oil level target values as determined by the microprocessor. The system shall display an error if the oil sensor signals low oil level for a period of 130 minutes or longer.
5. A default oil return algorithm shall automatically initiate the oil return mode if the system detects a failure of the oil sump sensor. A fault code shall be reported by the system.
6. Timed oil return operations or systems that do not directly monitor compressor oil level shall not be permitted.

7. Indoor Unit Fan Operation during Oil Return Cycle.
 - a. During oil return cycle indoor units operating in cooling or dry mode shall continue normal operation.
 - b. During oil return, indoor units that are commissioned with fans set for continuous operation shall maintain normal fan speed unless the leaving air temperature drops, then the fan speed will be reduced to low speed for the remainder of the oil return cycle.
 - c. During oil return cycle indoor unit fans will cycle off and remain off during oil return cycle while operating in all modes.

H. Fan and Motor Assembly

1. 6 ton frames shall be equipped with one direct drive variable speed propeller fan with Brushless Digitally Controlled (BLDC) motor with a vertical air discharge Heat Pump ARUN024GSS4 unit shall be equipped with one direct drive, variable speed, and axial flow fan with a horizontal air discharge. The motors shall be Brushless Digitally Controlled (BLDC), variable speed, inverter driven motors.
2. 8 to 20 ton frames shall be equipped with two direct drive variable speed propeller fan(s) with BLDC motor(s) with a vertical air discharge. Heat Pump ARUN038GSS4~ARUN060GSS4 and Heat Recovery unit ARUB060GSS4 shall be equipped with two direct drive variable speed axial flow fan(s) with a horizontal air discharge. Each fan shall be provided with an independent dedicated Brushless Digitally Controlled (BLDC), variable speed, inverter driven motors.
3. The fan(s) blades shall be made of Acrylonitrile Butadiene Styrene (ABS) material and incorporate biomimetic technology to enhance fan performance and reduce fan generated noise.
4. The fan(s) motor shall be equipped with permanently lubricated bearings.
5. The fan motor shall be variable speed with an operating speed range of 0-1150 RPM cooling mode and 0-1150 RPM heating mode. The fan assembly(s) shall have a minimum operating speed range from 0 RPM to 850 RPM in cooling mode and heating mode.
6. The fan shall have a guard to help prevent contact with moving parts.
7. The cabinet shall have option to redirect the discharge air direction from vertical to
8. The fan controller shall have a DIP switch setting to raise external static pressure of the fan up to 0.32 inch of W.C. to accommodate ducted installations.
9. The fan control shall have a function setting to remove excess snow automatically.
10. The fan control shall have a function setting to remove access dust and light debris from the outdoor unit and coil.

I. Cabinet

1. Outdoor unit cabinet shall be made of 20 gauge galvanized steel with a weather and corrosion resistant enamel finish. Outdoor unit cabinet finish shall be tested in accordance with ASTM B-117 salt spray surface scratch test (SST) procedure for a minimum of 1000 hours.

2. Cabinet weights and foot prints shall vary between 430 lbs., 7.61 sq. ft. (1.27 sq. ft. per ton), for 6 ton cabinet to 666 lbs., 10.14 sq. ft. (.51 sq. ft. per ton), for 20 ton cabinet for single cabinet configurations. The front panels of the outdoor units shall be removable type for access to internal components.
3. A smaller service access panel, not larger than 7" x 7" and secured by a maximum of (2) screws, shall be provided to access the following
 - a. Service tool connection
 - b. DIP switches
 - c. Auto addressing
 - d. Error codes
 - e. Main microprocessor
 - f. Inverter PCB
4. The cabinet shall have piping knockouts to allow refrigerant piping to be connected at the front, right side, or through the bottom of the unit.
5. The cabinet shall have a factory installed coil guard and shall have a baked enamel finish.

J. Outdoor Unit Coil

1. Outdoor unit coil shall be designed, built and provided by the VRF outdoor unit manufacturer.
2. The outdoor unit coil for each cabinet shall have lanced aluminum fins with a maximum fin spacing of no more than 17 Fins per Inch (FPI). All the outdoor unit coils shall be a 2 or 3 rows consisting of staggered tubes for efficient air flow across the heat exchanger.
3. Outdoor unit coil shall be comprised of aluminum fins mechanically bonded to copper tubing with inner surfaces having a riffling treatment to expand the total surface of the tube interior
4. The aluminum fin heat transfer surfaces shall have factory applied corrosion resistant Black Fin coating. The copper tubes shall have inner riffling to expand the total surface of the tube interior.
 - a. ISO 21207 Salt Spray Test Method B – 1500 hours
 - b. ASTM B-117 Acid Salt Test – 900 hours
 - c. The Black Fin coating shall be certified by Underwriters Laboratories and per ISO 21207. The above conditions shall establish the minimum allowable performance which all alternates must comply.
5. Variable Path Heat Exchanger: System shall have a variable flow and path outdoor heat exchanger function to vary the refrigerant flow and volume and path. Control of the variable path circuits shall be based on system operating mode and operating conditions as targeted to manage the efficiency and minimize or maximize the circulating volume of the operating fluids of the system. This feature allows MV 5 to maintain system head pressure that delivers "gas-furnace leaving air temperature" from the indoor unit at moderate and low ambient outdoor air temperatures. The outdoor unit coil, all indoor units and pipe network shall be field tested to a minimum pressure of 550 psig.

K. Compressor(s)

1. Compressor shall be designed and assembled by the VRF manufacturer specifically for use in the air source VRF product line. Third party manufactured, branded, or designed to the VRF system's OEM specifications by a third party manufacturer shall not be acceptable.
2. Compressor shall be a hermetic, high-side shell (HSS), commercial grade, compliant scroll direct-drive design.
 - a. Compressor Design: The compressor design shall be of the high pressure shell scroll type where the internal pressure below the suction valves of the compressor shall be at the same high pressure and high temperature. The motor shall be cooled by high pressure gas at temperatures above saturation conditions and minimize the mixing of refrigerant liquid with oil in the sump. The system shall employ a high pressure oil return method returning recovered oil from the oil separator directly into the oil sump of the compressor; oil shall not be allowed to return via the suction line. Bearing surfaces are continually coated with oil. The compressor shall employ an Aero-bearing constructed with high lubricity materials increasing operation time in case of low sump oil level. Compressor shall have a nominal operating range from 12Hz to 150 Hz.
3. The fixed and oscillating compressor scroll components shall be made of high grade (GC25) or denser steel material. All scrolls shall be heat treated and tempered.
4. The oscillating scroll shall be finely machined and polished. PVE refrigerant oil shall be used as the sole liquid used to maintain a seal between the high and low sides of the compression chamber. Compressors that require the use of any type of mechanical or wearable sealant material between the moving surfaces of the compression chamber is NOT ACCEPTABLE.
5. Vapor Injection: System shall have a medium pressure gas vapor injection function employed in the heating and cooling modes to increase system capacity when the outdoor ambient temperatures are low and lower compressor lift when temperatures are high. The compressor vapor injection flow amount shall be controlled by the vapor injection sub-cooling algorithm reset by discharge gas temperatures of the compressor.
6. Bearing surfaces shall be coated with Teflon® equal. Bearings shall be lubricated using a constant flow of PVE refrigerant oil to the bearing surfaces the film of oil separating the crankshaft journals and bearing surfaces shall be consistent at all times the crankshaft is in motion and shall be maintained irrelevant of crankshaft rotational speed.
7. An internal, integrated, mechanically driven gear pump shall draw oil from the compressor sump reservoir, pressurize the oil and inject the oil directly to the crankshaft journals maintaining a consistent film of oil between all moving parts. Auxiliary, indirect, or electronically driven pumps are not acceptable.
8. The viscosity property of the PVE oil in the compressor sump shall be maintained irrelevant of compressor operation and the surrounding ambient temperature.
 - a. The compressor shall be equipped with an external thermally protected electric crankcase heater that is automatically activated only when the ambient temperature is below freezing, and the compressor is not running

- to maintain the temperature of the oil in the sump above the refrigerant boiling point.
- b. During stable operation, irrelevant of ambient air temperature outside the water source unit, the temperature of refrigerant vapor in contact with the surface of the oil in the compressor sump shall be maintained above 140°F to prevent foaming and to eliminate refrigerant from mixing with the oil degrading the viscosity of the oil in the sump.
 - c. Low side shell (LSS) type compressors that use suction vapor to cool the compressor motor shall not be acceptable.
9. The compressor motor shall be designed to operate at high temperatures.
- a. The motor winding insulation shall be designed to operate continuously at a minimum temperature of 180°F without deterioration.
 - b. The motor cooling system shall be designed to maintain acceptable operational temperature at all times and in all conditions using high pressure, hot refrigerant vapor as motor coolant.
 - c. Low side shell and compressors that use low pressure, low temperature refrigerant gas to cool the motor are not acceptable.
10. Inverter Compressor Controller(s)
- a. Each compressor shall be equipped with a dedicated inverter compressor drive. The control of multiple compressors using a single drive is not acceptable.
 - b. The inverter drive shall vary the speed of the compressor crankshaft between zero (0) Hz and 140 Hz.
 - c. The inverter driver controller shall be matched with the physical properties of the compressor. The drive shall be manufactured by the VRF air source unit manufacturer. The inverter drive and matching compressor shall have been thoroughly tested as a matched pair. The inverter drive shall be programmed to avoid operating the compressor at any speed that results in harmonic vibration, nuisance noise, or mechanical damage to either the driver or the compressor with power provided that is within the tolerance specification.
 - d. The compressor inverter drive assembly and software must be designed, manufactured, and supplied by the VRF product manufacturer. Third party branded inverter driver hardware and/or driver software or inverter driver hardware and/or software provided by a third party manufacturer to meet OEM specifications of the VRF water source manufacturer will not acceptable.
 - e. All inverter drive hardware or software manufactured in, is a product of, or sourced from China, or using a broker or third party provider as an intermediary that obtains the product from CHINA shall not be acceptable.
11. Compressor(s)
- a. Each 6, 8, 10 ton frames shall be equipped with a single hermetically sealed, inverter driven, High Side Shell (HSS) scroll compressor.
 - b. 12, 14, 16, 18 and 20 ton frames shall be equipped with dual hermetically sealed, inverter driven, High Side Shell (HSS) scroll compressors.

- c. Each inverter driven, HSS scroll compressor shall be capable of operating from 12 Hz up to 150 Hz in any and all modes (cooling, heating or simultaneous modes).
 - d. The compressor shall be designed for a separate port for oil to be directly returned to the compressor oil sump.
 - e. The compressor bearing(s) shall have Teflon™ coating and shall be an aero type design using High lubricity materials.
 - f. The compressor(s) shall be protected with:
 - i. High Pressure switch
 - ii. Over-current /under current protection
 - iii. Oil sump sensor
 - iv. Phase failure
 - v. Phase reversal
 - vi. Compressor shall be capable of receiving injection of medium pressure gas at a point in the compression cycle where such injection shall allow a greater mass flow of refrigerant at lower outdoor ambient and achieving a higher heating capability. The VRF outdoor unit shall have published performance data for heating mode operation down to -13°F on both heat pump and heat recovery systems.
 - g. Standard, non-inverter driven compressors shall not be permitted nor shall a compressor without vapor injection or direct sump oil return capabilities.
12. Heat Pump models:
- a. The compressor shall be a high efficiency high-side shell rotary hermetic design. Bearing shall be manufactured using high lubricity material. Compressor shall be factory charged with Polyvinyl Ether (PVE) oil. Single or dual speed compressors charged with oil (POE) shall not be acceptable. Compressor inverter drive shall Polyolester allow modulation from 20Hz to 90Hz with control in 1.0 Hz increments depending on the nominal capacity. (ARUN060GSS4) The compressor shall be a high-side shell hermetic scroll design. Oil sump area and chamber housing the motor shall be operated at the same temperature and pressure of the gas leaving the compressor chamber to ensure that the low temperature low pressure refrigerant returning to the compressor does not mix with the oil in the sump. Bearing shall be manufactured using high lubricity material. Compressor shall be factory charged with Polyvinyl Ether (PVE) oil. Single or dual speed compressors charged with Polyolester oil (POE) oil shall not be acceptable. Compressor motor shall be designed to operate at a frequency range of 0Hz to 160Hz. Compressor inverter drive shall allow modulation from 12Hz to 110Hz.
13. Heat Recovery models:
- a. The compressor design shall be of the high pressure shell scroll type where the internal pressure below the suction valves of the compressor shall be at the same high pressure and high temperature. The motor shall be cooled by high pressure gas at temperatures above saturation conditions and minimize the mixing of refrigerant liquid with oil in the sump. The system shall employ a high pressure oil return method

returning recovered oil from the oil separator directly into the oil sump of the compressor; oil shall not be allowed to return via the suction line. Bearing surfaces are continually coated with oil. The compressor shall employ an Aero-bearing constructed with high lubricity materials increasing operation time in case of low sump oil level. Compressor shall have a nominal operating range from 12Hz to 110 Hz.

L. Operational Sound Levels

1. Each single frame outdoor unit shall be rated with an operational sound pressure level not to exceed as listed on below chart when tested in an anechoic chamber under ISO 3745 standard at the highest field selectable heating operating modes available. Such documentation shall be presented in all submittals, manufactures who elect to rate their equipment at other than tested in an anechoic chamber under ISO 3745 standard at the highest field selectable heating operating modes available and the highest field selectable conditions shall not be allowed.
2. A field setting shall be available to program the outdoor unit to reduce sound levels at night, when desired, to a selectable level while still able to meet building load requirement. This mode is available in both cooling and heating modes.

M. Sensors

1. Each outdoor unit module shall have:
 - a. Suction temperature sensor
 - b. Discharge temperature sensor
 - c. Oil level sensor
 - d. High Pressure sensor
 - e. Low Pressure sensor
 - f. Outdoor temperature sensor
 - g. Outdoor humidity sensor
 - h. Outdoor unit heat exchanger temperature sensors

N. Wind Load Installations for Outdoor Units

1. LG FL Wind load Installation Drawings meet the requirements of the 2017 Florida Building Code, 6th Edition and ASCE Standard 7-2010.

O. Seismic Installations

1. Provide OSHPD Special Seismic Certification Preapproval (OSP) documents for certified product list of VRF equipment to be installed in high seismic risk areas. Provide LG supplemental installation documents in conformance with CBC 2013, 2016 and 2019 California Building Code and IBC 2012, 2015 and 2018 International Building Code.

P. Warranty

1. Limited Warranty Period

- a. STANDARD ONE-YEAR PARTS WARRANTY FOR A QUALIFIED SYSTEM - The Part(s) of a qualified System, including the compressor, are warranted for a period (the "Standard Parts Warranty Period") ending on the earlier to occur of one (1) year after the date of original installation, or eighteen (18) months from the date of manufacture.
 - b. ADDITIONAL SIX (6) YEAR COMPRESSOR PART WARRANTY - The Compressor is warranted for an additional six (6) year period after the end of the applicable Standard Part Warranty Period (the "Compressor Warranty Period").
2. Extended Warranty
- a. The Standard Warranty Period and the Compressor Warranty Period are extended to a total of ten (10) years (the "Extended Warranty Period") for qualified Systems that have been (a) commissioned by a party that has completed the current Training Requirements, (b) such commissioning is pursuant to LG's current published instructions, and (c) the System commissioning results and supporting documents are entered correctly into LG's online commissioning system. Commissioning of a System requires one (1) hour of LG Monitoring View (LGMV) data. Commissioning results must be entered into LG's online commissioning system within sixty (60) days of System startup.
- 2.2 EEV KIT
- A. General
1. Unit shall be manufactured by LG.
 2. Unit shall be factory assembled and wired unit shall be designed to be installed indoors only, when installed outdoors provide NEMA weatherproof enclosure.
 3. Unit shall be capable to be installed with heat pump or heat recovery VRF system.
 4. Unit requires one communication kit to provide power and control signals.
 5. Connects liquid line piping from outdoor unit to any AHU coil.
- B. Electrical
1. Six conductor, 18 GA shielded and stranded field supplied wiring for 12 volt (low voltage) power and control signal from communication kit.
- 2.3 AHU COMMUNICATION KIT PAHCMR00 (RETURN AIR CONTROL)
- A. General
1. Unit shall be manufactured by LG.
 2. Unit shall be factory assembled and wired.
 3. Unit shall be designed to be installed for indoor or outdoor.
 4. Unit shall be capable to be installed with heat pump or heat recovery VRF system.

5. Allows communication between third party air handling unit (AHU) and LG Multi V air-source or water-source outdoor units with combination ratio between 50% to 100%.
6. Requires one EEV kit to control the flow of refrigerant from Multi V outdoor unit to AHU coil.

B. Electrical:

1. The unit electrical power shall be 208-230/1/60 (V/Ph/Hz).

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.
- B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

- A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION 230266

SECTION 230290 - DUCT MOUNTED ELECTRIC HEATING COILS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 DUCT MOUNTED ELECTRIC HEATING COILS

- A. Electric duct heaters shall be open coils type as manufactured by Warren Mfg. Co. voltage, KW size, number of steps and accessories shall be as shown. Units shall be U.L. listed for zero clearance and meet all applicable requirements of the latest National Code and ANSI Standards.
- B. Heating elements shall be high grade nickel-chrome. Element temperatures shall not exceed 400 degrees F. below the melting point of the element alloy when energized with design voltage in still, free air at 75 degrees F. ambient.
- C. Heater frames and control boxes shall be constructed of 20 gauge galvanized steel or heavier. Frames shall be hot dipped galvanized after fabrication if spot welds are used.
- D. Mounting assemblies for the element support insulators shall pass between the insulators permitting free expansion of the insulators under high temperature conditions without cracking or breaking.
- E. Each heater shall have a infinite step capability using SCR controls. All necessary controls for recycling shall be provided in heaters of more than 48 amps.
- F. The following features and accessories shall be furnished as an integral part of each unit:
 - 1. Air Pressure Switch.
 - 2. Control Transformer
 - 3. Magnetic Contactors
 - 4. SCR Controls
 - 5. Disconnect Switch

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.
- B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

- A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION 230290

SECTION 230340 - FIN-TUBE RADIATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 FIN TUBE RADIATION

- A. Furnish and install fin-tube heating elements and enclosures, indicated on Drawings, together with required mounting components and accessories.
- B. Materials shall be as manufactured by Sterling Radiator Co., Vulcan Radiator Co. or Standard Fin-Pipe Radiator Corp.
- C. Heating Elements
 - 1. Various lengths and assemblies are indicated on the plan together with their pipe sizes, fin sizes, and spacing. Elements shall be completely independent of and shall not touch enclosures to assure low surface temperature.
 - 2. Heating elements shall consist of full-hard aluminum plate fins not less than .20" thick, permanently bonded to copper seamless drawn tube and guaranteed for working pressure at 300 degrees F not less than 200 psi for 1-1/4" tube. Fins shall be actually embedded in the copper tube.
- D. Enclosure and Accessories
 - 1. Enclosures and accessories shall be of style and dimensions indicated on our Drawings and shall be fabricated from zinc-coated steel. Enclosures shall be 16 gauge. On wall-to-wall applications, enclosures shall be furnished in one piece up to a maximum of 10' - 10" enclosure length for rooms or spaces measuring a maximum of 10' - 10" wall length, using a 6" end trim each end. Enclosures shall be furnished in two or more lengths for wall lengths exceeding 10' - 10".
 - 2. Left end of all enclosures shall have spot-welded back-up angles. The mating right end shall be fastened securely with screws. End enclosures shall have same method of joining.
 - 3. End trims, furnished with roll-flanged edges, shall be used between ends of enclosures and walls on wall-to-wall applications. End trims to be 6" maximum length and shall be attached without visible fasteners. End enclosures shall be furnished where indicated, shall be same gauge as enclosures, and be factory-welded to enclosures.

4. Enclosures shall be supported at top and bottom by means of heavy gauge mounting channel and allow installation and removal of enclosures without scraping walls or disturbing paint lines. Enclosures are securely fastened to the bottom support.
 5. Access doors shall be provided where noted on Drawings. Doors shall be 8" x 8" and shall be located directly in the enclosures. Doors shall be hinged. Where radiation is located behind casework coordinate access door locations with casework vendor.
 6. Provide vertical and horizontal enclosure for pipe risers and runouts which are exposed above/below/adjacent to radiation enclosure. Riser enclosure shall be of same gauge and finish as radiation enclosure. Provide wall plate which enclosure shall snap onto without exposed fasteners. Sterling model PCH (V).
 7. Enclosure finish shall be as selected by Architect (and shall match unit ventilator finish when unit ventilators are also specified for the project).
- E. Enclosure Brackets and Element Hangers
1. Enclosure bracket and element hangers shall be installed not farther than 4' apart. Brackets shall be die-formed from 3/16" thick stock, 1-1/2" wide, and shall be lanced to support and position lower flange of enclosure. Enclosures shall be firmly attached to brackets by set screws, operated from under the enclosure. Devices which do not provide positive fastening of enclosures are not acceptable. Brackets shall be inserted in pre-punched slots in mounted channel to insure correct alignment and shall be fastened securely to wall at bottom.
 2. Sliding saddles shall support heating elements and provide positive positioning of element in enclosure to insure maximum heating efficiency while preventing any possibility of fin impingement on brackets or enclosure joints during expansion or contraction. Element supports shall be a double saddle design fabrication from 16 gauge zinc-coated steel.
 3. Saddle shall slide freely on saddle support arm bolted to support bracket. Support arm shall allow 1-1/2" height adjustment for pinch. The element support saddle shall allow 1-5/8" lateral movement for expansion and contraction of heating element. Rod or wire hangers not acceptable.
 4. Submit shop drawings of all heating elements and enclosures. Enclosure measurements and accessories are not to be fabricated until after verified measurements have been taken at the site.
- F. Piping Enclosures: Where concealed piping in ceilings and wall of finished spaces is not possible, provide vertical or horizontal metal piping enclosures equal to "Sterling" model PCH (horizontal) or PCHV (vertical). Provide all required hangers, supports, corners, brackets, etc. color per Architect.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.
- B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

- A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION 230340

SECTION 230400 - SHEETMETAL WORK AND RELATED ACCESSORIES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements shall govern work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 SHEETMETAL DUCTWORK

- A. Contractor shall furnish and install all sheetmetal ducts as shown on the Drawings. While the Drawings shall be adhered to as closely as possible, the Engineer reserves the right to vary the run and size to meet the field conditions. Any duct size not shown shall be sized in proportion to the air carried at the same resistance in similar ductwork, or of size as directed.
- B. All ductwork shall be constructed of galvanized steel gauges in accordance with the latest edition of the ASHRAE/SMACNA Guide. Bracing angles for ductwork shall be hot dipped galvanized for steel ductwork and appropriate gauge for aluminum ductwork. All ducts 18" and over in width shall be cross broken to prevent flutter.
- C. Round ductwork shall be galvanized steel, spiral lock seam construction of gauges in accordance with the latest edition of ASHRAE/SMACNA guide. Fittings shall be constructed in standing seam manner. All seams, joints and collars shall be sealed in accordance with SMACNA guidelines for medium pressure ductwork to minimize noise and streaking. Ductwork and fittings shall be connected with sheetmetal couplings and sealed as to allow no leakage.
- D. Ducts shall be braced as follows:
 - 1. All ducts not exceeding 24" on one side shall be assembled with airtight slip joints.
 - 2. 25" to 40" larger dimension 1" x 1" x 1/8" angles.
 - 3. 41" to 60" larger dimension 1-1/2" x 1-1/2" x 1/8" angles.
 - 4. All bracing angles shall be a minimum of 4' apart along the length of the duct.
 - 5. Furnish and install all angles and frames for all registers, diffusers, grilles, and louvers.
 - 6. Support horizontal ducts with hangers spaced not more than 8' apart. Place hangers at all changes in direction. Use strap hangers for cuts up to 30" wide.
- E. Comply with all State and Local regulations regarding fire stopping and fireproofing. Provide fusible link fire dampers as required by State, local and Underwriter authorities and where indicated on the Drawings. Each fire damper shall be installed in such a manner as to permit ready access for inspection and maintenance purposes.

- F. Provide splitter and butterfly dampers, deflecting vanes for control of air volume and direction and for balancing systems, where indicated, specified, directed and as required for the proper operation of the systems. Dampers shall be of the same material as the duct, at least one gauge heavier than the duct, reinforced where indicating quadrant and locking device for adjusting damper and locking in position.
- G. Where ducts fewer than 100 square inches penetrate a rated wall, steel ductwork system of a minimum 0.0127 inch thickness shall be used.
- H. All elbows shall have a minimum center line radius of 150% of duct width. If the radius is smaller, turning vanes shall be used: Turning vanes shall be double thickness, fitted into slide strips and screwed or riveted to duct below.
- I. Contractor shall furnish and install all access doors in ducts as required. Access doors shall be of the pan type 1" thick and shall be provided with two galvanized hinges and suitable latched. Access doors insulated with same thickness material as duct and shall be double casing construction.

2.2 REGISTERS AND DIFFUSERS

- A. Registers and diffusers shall be installed where shown on the Drawings and shall be of the sizes specified and the type indicated on the drawing schedule.
- B. All registers and diffusers shall be installed in accordance with manufacturer's recommendations.
- C. Registers and diffusers shall be as manufactured by Carnes, Hart and Cooley or Anemostat Co.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.
- B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

- A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION 230400

SECTION 230410 - PIPING, FITTINGS, VALVES AND NOTES (HOT WATER)

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements shall govern work in this section. Submit shop drawings for checking and approval.

1.1 PIPING NOTES

- A. The Contractor shall erect all pipe, fittings, valves, hangers, anchors, expansion joints and all accessories specified, indicated on the Drawings or required to assure proper operation of all piping systems installed under this Contract. All piping shall be maintained at a proper level to assure satisfactory operation, venting and drainage. Piping and valves in any locality where possible shall be grouped neatly and shall be run so as to avoid reducing headroom or passage clearance.
- B. All piping shall be new and of the material and weight specified under various services. Steel and wrought iron pipe 2" and larger shall be seamless or lap welded. All piping shall have the maker's name and brand rolled on each length of pipe.
- C. All piping, fittings, valves and strainers shall be cleaned of grease, dirt and scale before installation. All temporary pipe openings shall be kept closed during the performance of the work. The ends of all piping shall be reamed smooth and all burrs removed before installation.
- D. All piping shall be cut accurately to measurements taken on the job. Offset connections shall be installed alignment of vertical to horizontal piping and where required to make a true connection and to provide for expansion. Bent or sprung pipe shall not be installed where shown on Drawings and where necessary to provide for expansion of piping. Cold spring hot lines one-half estimated distance of maximum expansion. Suitable pipe anchors shall be installed where shown or required.
- E. Piping connections shall have unions where necessary for replacement and repair of equipment. Gate valves and controls valves shall be installed where shown and where necessary for proper operation and service.
- F. Vertical piping shall be plumb and horizontal piping shall be parallel to walls and partitions. Piping shall be supported as required to prevent the transmission of noise and vibration.
- G. Work shall include all pipe, fittings, offsets and requirements for the installation of piping of other work including ducts and conduit. Reducing fittings shall be used where pipe changes size. All piping shall be installed with ample clearance to center accurately in sleeves through floors, and walls and partitions.
- H. Piping shall be downgraded to drain connections at low points and upgraded to vent connections at high points unless otherwise noted. Drain connections shall be valved and piped to a floor drain. Vent connections on mains shall be equipped with air vent valves fitted with a copper tube drip line extended to a drain outlet. Vent connections on branches and equipment shall be fitted with key type manual vent cocks.

- I. Drain piping shall be installed from all equipment as required. The Contractor shall extend drain piping and turn down over floor drains.

PART 2 - PRODUCTS

2.1 PIPING (ABOVEGROUND)

- A. All piping installed under this Section of the Specifications shall be in accordance with the following schedule.
 1. All piping, except where indicated differently, (i.e. underground piping) shall be standard weight black steel pipe Schedule 40, Grade A53, black steel. Pipe 2" and smaller, cast iron screwed fittings. Pipe 2-1/2" and larger, steel welding fittings. Pipe and fittings as manufactured by National, Wheeling, Bethlehem or equal, manufactured in accordance with ASTM current edition. All pipes must be reamed before installation.
 2. Where the Contractor elects to use copper piping, it shall be rigid Type "L" copper, Chase, Anaconda or approved equal. Fittings shall be wrot copper, Nibco, Anaconda, Mueller or approved equal. Where copper piping is used, make all additional provisions for expansion. All condensate piping shall be Type "M" copper, rigid, full size of unit drain tapping, or larger as shown on Drawings.
 3. All drainage pipe lines, 2" larger except where galvanized screw pipe is shown on the Drawings or specified hereafter, shall be extra heavy cast iron soil pipe and fittings.
- B. Piping installation shall be arranged for draining through accessible valves at low points.
- C. Threaded short and close nipples shall be Schedule 80, extra heavy weight of the same material as pipe in system in which they are installed.
- D. All bare copper pipe, tubing and fittings shall be cleaned with steel wool and all excess solder shall be removed.

2.2 VALVES

- A. All valves, unless specified or noted otherwise, shall be designed for a working pressure of not less than 200 p.s.i. water or 125 p.s.i. steam with name and pressure rating of valve cast in body. All valves shall be of the same manufacturer, unless specified otherwise. Valves for cut-off shall be gate valves, unless otherwise specified.
- B. All valves of same manufacturer: similar to Jenkins Bros., Walworth, Kennedy or approved equal.
- C. Four inch and larger, flanged; smaller sizes, screwed.
- D. All Gate and Globe valves shall be installed with handle in an upright position.

- E. The Contractor shall furnish and install all valves shown on Drawings and all valves that are necessary for proper operation and maintenance of systems and equipment. All piping connections to each piece of equipment and all branch connections to mains shall have cut-off valves.
- F. The following schedule of valves for steam condensate, hot water, etc. is based on Jenkins Brothers, Inc. catalog numbers (except as noted); equivalent Lukenheimer, Walworth, O-I-C, Crane Fairbanks Company valves will be acceptable.
- G. Ball Valves
1. 1/4" to 2-1/2" rated for 600 p.s.i wog, with brass body, chrome plated brass ball, virgin PTFE seats, and full port with threaded or solder connections.
 2. 2-1/2" and larger rated for 200 p.s.i with carbon steel body, stainless steel full port ball, RTFE seats, lever operated to 4" gear operated 6" and above, with flanged end connections.
- H. Gate Valves
1. Up to 2": Bronze gate solid wedge, inside screw traveling stem union bonnet, - Fig. 47U
 2. 2-1/2" and 3": Iron body, bronze-mounted gate, solid wedge, OS&Y rising stem, -Fig. 650-A
 3. 4" and larger: Iron body, bronze-mounted gate, solid wedge, OS&Y rising stem, -Fig. 651-A
- I. Globe Valves
1. Up to 2": Bronze body, regrinding seat ring and plug, union bonnet, -Fig. 546P
 2. 2-1/2" and 3": Iron body, bronze-mounted globe and angle, regrinding disc and seat ring, OS&Y -Fig. 613
 3. All gate valves 6" and larger: Fitted 3/4" by-pass globe valve.
- J. Plug Valves
1. Up to 2": Lubricated, semi-steel short pattern wrench operated, -Fig. 142
 2. 2-1/2" and larger: Lubricated, semi-steel short pattern wrench operated, -Fig. 143
 3. Similar to Rockwell Mgd. Co., Jenkins, Kennedy or approved equal.
- K. Butterfly Valves used for chilled water, condenser water and hot water shall be the following:
1. 2-1/2" to 12" rated for 175 p.s.i bubble tight close off, 14" and larger for 150 p.s.i close-off.

2. Full lug cast iron body, aluminum bronze disc, stainless steel stem EPDM peroxide cured seat.
3. 2-14" to 6" valves to be equipped with 10 position notch plate and lever lock handle. 8" and larger with handwheel gear operator.
4. On installation, valves to be in full open position when flange bolts are tightened and stem in a horizontal position except when equipped with a chainwheel gear operator.
5. Provide chain wheel gear operator on all valves installed 7 feet or higher.
6. Valves to be designed with replaceable seat and parts kits.
7. Valve to be Bray series 31, Dezurik 637 or Demco.

L. Check Valves

1. 150 p.s.i. WSP class.
2. Up to 2": Bronze, regrinding bronze disc, screw-in cap, -Fig. 762A
3. 2-1/2" and 3": Iron body, bronze mounted regrinding bronze seat ring and disc, - Fig. 623
4. 4" and larger: Iron body, bronze mounted regrinding bronze seat ring and disc, - Fig. 624

M. Drain Valves: All low points shall have drain valves, with hose ends. Where 1/2" and 3/4" sizes are indicated, "Standard" hose end drain valves shall be used. Provide brass hose end drain caps at each drain valve. Where larger than 3/4" drains are shown, gate valve shall be used. Provide brass nipples and reducer from drain valve size to 3/4" terminating with 3/4" hose end drain valve and cap.

2.3 FITTINGS

A. Nipples

1. All nipples shall have clean cut threads and shall be made from new pipe, standard weight for all lengths, except that close and shoulder nipples shall be extra heavy.
2. Fittings - 2-1/2 and Smaller: All fittings shall be standard weight steam pattern gray cast iron, Grinnell, Stockholm or equal approved.
3. Fitting - 3" and Larger: The Contractor has the option to use screwed, flanged or welded fittings so long as all ASME requirements are met.

B. Joints and Unions

1. Threaded joints shall be full and clean cut. The ends of pipe shall be reamed to the full inside diameter, all burrs shall be removed and no more than three threads shall be exposed beyond fittings when made up. Joints shall be made up tight with graphite base pipe joint compound. Exposed threads of ferrous pipe shall be painted with acid-resisting paint after caulking, lampwick or other material will be allowed for correction of defective joints.
 2. Flange joints shall be made up perfectly square and tight. Screwed flanges and loose flanges shall be cast iron and welding flanges shall be steel. Flanges shall be faced true and bolted up tight with 1/16" Carlock ring type gasket.
 3. Bolts shall be high quality steel with hexagon nuts and heads. The Contractor shall apply grease to threads of bolt.
 4. Welded joints in piping shall be by the electric or oxyacetylene process using welding rods if the characteristics similar to pipe material and as recommended by the pipe manufacturer and shall be done in accordance with the ASME Code for pressure piping. Welding shall be done by qualified welders under the requirements of the ASME Boiler and Pressure Vessel Code.
 5. The pipe lengths shall be aligned with welding rings and the abutting pipe ends shall be concentric. Prior to welding, the groove and adjacent surfaces shall be thoroughly cleaned of all grease, scale, or rust. During welding, all slag, or flux remaining on the bead shall be removed before laying down the next bead. The welding metal shall be thoroughly fused with the base metal at all sections of the weld. Short lengths of pipe may be beveled on the job with oxyacetylene torch, provided all scale and oxides are removed.
 6. Joints shall be butt-welded, single V-type. All fittings shall be steel welding fittings. Elbows and fittings formed with coupling or welded cut pipe sections shall not be acceptable.
 7. Bonney Weldolets or welding saddles may be used for branch connections, which are less than one-half the size of the main to which they connect.
 8. Ground Joint Unions, Flange Connections, Reaming & Filling Ground joint unions shall be 200 lb. s.w.p. for brass. Flanges shall be 150 lb. s.w.p. for brass, 125 lb. s.w.p. for cast iron.
 9. Ground joint unions of flanges shall be used only on exposed accessible piping. Where concealed, right and left nipples and couplings must be used. Where flanged connections are used, full size gaskets must be inserted.
- C. Threads: Shall be standard, clean cut and tapered. All piping shall be reamed free from burrs. All piping shall be kept free of scale and dirt. Caulking of threads will not be permitted. All piping shall be threaded and made up in accordance with the current edition of the ASA Standard Specifications for pipe threads.

D. Unions

1. Unions for use on ferrous pipe 2" and smaller shall be malleable iron with brass to iron ground joint spherical seat and threaded connections. Unions 2 1/2" and over shall be flanged type with gasket.
2. Unions for copper tubing shall be cast bronze conforming to ASA B16. The Contractor shall furnish adapters where required for copper pipe.
3. Where copper pipe connects to ferrous pipe or metals, the Contractor shall furnish EPCO isolating type dielectric unions. Plastic type isolating bushings are not acceptable.
4. Unions shall be installed wherever necessary for repair or replacement of equipment, valves, strainers, etc. Final connections to equipment shall be made in a manner that will permit removal without cutting of pipelines.

E. Solder

1. All sweat joints shall be made up with 95/5 solder.
2. Solder shall be National Lead or approved equal. Flux shall be non-toxic and non-corrosive.
3. All copper tubing ends shall be reamed, filed and cleared of burrs and rough edges. All pipes shall be reamed after cutting and threading.

F. Expansion

1. The entire piping installation shall be installed with adequate provision for expansion. No rigid connections will be permitted.
2. Branches shall be of sufficient length and have 3 elbow swings to allow for pipe expansion.
3. Provide expansion joints, guides and anchors equal to "Metra-Flex MetraLoops" where indicated on Drawings or where necessary for proper expansion compensation. Submit shop drawing.
4. Any breaks in the piping within the guarantee period due to improper provision for expansion must be replaced at the expense of this Contractor, and the conditions corrected to prevent future recurrence.
5. Any damages to surrounding areas and equipment due to this failure shall also be repaired and paid for at the expense of the Contractor.
6. Joints to have 150 psi rating, ANSI-B16.5 with liner and cover.

2.4 PIPING SLEEVES

- A. Furnish sleeves built into place for all piping passing through walls, floors or building construction. Sleeves, not less than 1/2" larger in diameter than piping and its covering, if any, and extending full depth of construction pierced. Pack sleeves through walls/floors in accordance with Underwriters' Requirements.

- B. Sleeves piercing exterior walls, integral waterproofed walls shall be standard weight steel piping. Furnish welded center flange buried in construction for sleeves through exterior walls below grade. At exterior walls, make pipes watertight in sleeves with oakum packing and caulked lead joints on both sides of wall. All other sleeves: Galvanized sheet steel with lockseam joints, #22 USSG for 3" or under. Sleeves for piping 4" and larger, #18 USSG.
- C. Pipes passing through interior membrane waterproofed floors, cast iron flashing sleeve, with integral flashing flange and clamping ring, similar to Josam Series #1880. Adjust sleeves to floor construction with steel or wrought iron pipe nipples top and bottom, extending 3" above finished floor. Burn & J.R. Smith are equal.
- D. Pipes passing through membrane waterproofed walls, cast iron flashing sleeve with internal flashing flange and clamping ring similar to Josam Series #1870. Make pipes watertight in sleeves with oakum packing and caulked lead joints. Burn & J.R. Smith are equal.
- E. For flashing sleeves specified in Pars. C and D, lead flashing extended at least 10" around flashing sleeves, securely held in place by clamping device.

2.5 PIPING ENCLOSURES

- A. Where concealed piping in ceilings and wall of finished spaces is not possible vertical or horizontal metal piping enclosures equal to "Sterling" model PCH (horizontal) or PCHV (vertical). Provide all required hangers, supports, corners, brackets, etc. color per Architect.

PART 3 - EXECUTION

3.1 GENERAL NOTES - PIPING NOTES, DRAINING, VENTING AND MISCELLANEOUS WATER SPECIALTIES

- A. Piping shall be installed as indicated on Drawings. Elevations and dimensions are indicated as a guide only and are subject to change with actual job conditions.
- B. Except for drainage piping, which shall pitch down with flow, mains shall pitch upward or be installed dead level as indicated. Horizontal runs shall be parallel to walls.
- C. In general, all branch connections shall be top of bottom 45 degree or 90 degree, pitching up or down from mains.
- D. Where indicated, flexible connectors shall be installed. All final connections to equipment, pumps, units, etc. shall have companion flanged, flange unions or ground joint unions. (125 lbs.)
- E. All piping shall be adequately supported with approved type hangers so as to prevent absolutely any sagging of lines, or any undue strain on pipes or fittings. All pipe lines shall be capped during construction to prevent entry of dirt or other foreign material. All piping lines after erection shall be blown or flushed out to render the piping system as clean as possible before system water is added for operation.

- F. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.
- G. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.
- H. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.2 DRAINING

- A. All low points shall have drain valves with hose ends. Where 1/2" and 3/4" sizes are indicated, "Standard" hose end drain valves shall be used. Provide brass hose end drain caps at each drain valve. Where larger than 3/4" drains are shown, gate valve shall be used. Provide brass nipple and reducer from drain valve size to 3/4" terminating with 3/4" hose end drain valve and cap.

3.3 VENTING (For Hot Water)

- A. All high points in piping shall be vented automatically with float vents. At all high points of piping, whether specifically indicated or not, provide Maid-o-Mist or B&G No. 7 or 27 Air Eliminators with shut off cock, auxiliary key vent and copper tubing overflow carried to floor along wall as indicated or directed.

3.4 WATER SPECIALTIES

- A. Air Vents: Install at all high points automatic air vents to eliminate air binding. All automatic air vents shall be approved heavy duty type equipped with petcocks and tubing for manual venting. All vents installed in coils, etc. shall be of manual key operated type. All vents concealed from view shall be accessible through access doors. Vents shall be by Hoffman, Anderson or Bell & Gossett, 125 p.s.i.g. rated.
- B. Pressure Gauge: Furnish and install pressure gauges on suction and discharge sides of each pump and as required to check operation of equipment; pressure gauges shall have 4-1/2" diameter dials, Ashton, Ashcroft or approved equal.
- C. Install thermometers at all locations in piping system as noted on Drawings and as required to check system performance. Thermometers shall be installed at the supply and return of coils and 3-way diverting valves as manufactured by Trerice, Weksler or Moeller, with 4-1/2 inch face, cast aluminum case, chrome plated steel ring, white background with black embossed markings, glass window, stainless steel pointer, brass movement, 316 stainless steel bulb. Provide separable, universal angle sockets for all thermometers.

END OF SECTION 230410

SECTION 230420 - SUPPORTS, SLEEVES AND PLATES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

- A. This Contractor shall furnish and install all plates, hangers and supports for his equipment including piping, headers, fans expansion tank, ductwork, etc.
- B. All ductwork, piping and equipment shall be hung or supported from structural members only.

PART 2 - PRODUCTS

2.1 PIPING, DUCTWORK AND EQUIPMENT

- A. All piping shall be supported from building structure in a neat and workmanlike manner wherever possible, parallel runs of horizontal piping shall be grouped together on trapeze hangers. Vertical risers shall be supported at each floor line with steel pipe clamps. Use of wire perforated metal to support pipes will not be permitted. Hanging pipes from other pipes will not be permitted.
- B. Necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations shall be furnished and installed. In all cases where hangers, brackets, etc., are supported from concrete construction, care shall be taken not to weaken concrete or penetrate waterproofing.
- C. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers supporting piping expanding into loops, bends and offsets shall be secured to the building structure in such a manner that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted, both in the vertical and horizontal direction, when the supported piping is hot.
- D. Pipe hangers shall be as manufactured by Grinnell, whose catalog numbers are given herein, or equivalent Carpenter and Paterson, or F&S Mfg. Co.
- E. Piping shall be supported as follows unless otherwise indicated on the Drawings:
 - 1. Heating piping shall be 1-1/2 " and smaller Fig. #260 adjustable clevis hanger. 2" and larger Fig. #174 one-rod swivel roll hanger.
 - 2. Two-rod hangers shall be used for piping close to the ceiling slab or where conditions prohibit use of other hanger types.

3. Anchors for hanger rods shall be Phillips "Red Head" self-drilling type. Anchors shall be placed only in vertical surfaces.
 4. Spacing of pipe supports shall not exceed 8 feet for pipes up to 1-1/2" and 10 feet on all other piping.
 5. Hangers shall pass around insulation and a 16 gauge steel protective cradle; 12" long shall be inserted between hangers and insulation. Insulation under cradle shall be high density calcium silicate or approved equal to prevent crushing.
 6. All piping shall be supported to allow free movement where expanding or contracting. Pipe shall be anchored as required or directed.
 7. All lateral runs of piping shall be securely supported on hangers, rolls, brackets, etc. and in manner to allow for proper expansion and elimination of vibration.
 8. 2" and smaller pipe, where run on walls, shall be supported on wrought iron "J" hook brackets with anchor bolts.
 9. All horizontal pipes, where run overhead or on walls, shall be supported as follows unless otherwise indicated:
 - a. On adjustable steel clevis type hangers suspended on hanger rods, pipe sizes up to and including 4".
- F. Space limitations in hung ceilings spaces and conditions in other locations may require use of other type of hangers than those specified above. Suitable and approved pipe hangers shall be provided for such job conditions.
- G. All supports shall be fastened to structural members or additional steel supports furnished by this Contractor.
- H. Hanger rods shall be steel, threaded with nuts and lock nuts sizes in accordance with the following schedule:
- | <u>Pipe Size</u> | <u>Rod Size</u> |
|-------------------------|-----------------|
| 3/4" to 2" inclusive | 3/8" |
| 2-1/2" and 3' inclusive | 1/2" |
| 4" and 5" inclusive | 5/8" |
| 6" | 3/4" |
| 8" to 12" inclusive | 7/8" |
- I. Hangers for copper tubing shall be tacked up with formed lead sheet on which tubing or pipe shall be placed.
- J. Where pipes pass through masonry, concrete walls, foundations, or floors, this Contractor shall set sleeves as are necessary for passage of pipes. These sleeves shall be of sufficient size to permit insulation where required to be provided around pipe passing through. This Contractor shall be responsible for exact location of these sleeves.

- K. Sleeves shall not be used in any portion of building where use of same would impair strength of construction features of the building. Inserts for supporting lateral pipes and equipment shall be placed and secured to form work, and all sleeves inserts locations shall be thoroughly checked with Architect so as not to conflict with other trades.
- L. Where pipes pass through floor or walls, they shall be provided with chromium plated escutcheons.
- M. Anchor horizontal piping where indicated and wherever necessary to localize expansion or prevent undue strain on branches. Anchors: Heavy forged construction entirely separate from supports.
- N. Anchor vertical piping wherever indicated and wherever necessary to prevent undue strain on offsets and branches. Anchors, unless otherwise noted: Heavy steel clamps securely bolted and welded to pipes. Extension ends shall bear on building construction.
- O. Ducts shall be hung with 1" x 1/8" metal straps. When width of duct is less than 48", hangers shall be fastened to side of ducts. Auxiliary steel supports that may be required for all mechanical equipment shall be furnished and installed by this Contractor. All operating equipment including fans, piping, etc. shall be supported so as to produce minimum amount of noise transmission.
- P. Refer to "General Conditions" as well.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.
- B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

- A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION 230420

SECTION 230430 - INSULATION AND COVERINGS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

- A. Furnish insulation for all piping, equipment and sheetmetal work as noted.
- B. Insulate no piping, ducts or equipment until tested and approved for tightness. All piping and ducts shall be dry when covered. Where existing insulation has been damaged, altered or removed during the course of the work, it shall be replaced with new insulation in a neat manner to match the adjacent insulation.
- C. All insulation must be done by an approved Sub-Contractor or by mechanics skilled in this line of work.
- D. Fire hazard classification shall be 2550 per ASTM E-84, NFPA 255 and UL 723. Insulation shall be rated non-combustible type classified flame spread - 25, smoke developed - 50.

PART 2 - PRODUCTS

2.1 DUCTWORK (INDOOR)

- A. All supply, outside air intake and exhaust (on discharge side of fan) and return (in unconditioned spaces) ductwork shall be covered with fiberglass with aluminum foil vapor barrier. All joints shall be lapped so maximum coverage is achieved.
- B. All insulated ductwork shall be insulated with thick fiberglass board insulation with canvas finish in areas where ductwork is exposed.
- C. Insulation thickness shall be in accordance with the latest edition of the New York State Energy Conservation Construction Code.
- D. Thermal acoustic lining of ductwork where indicated shall be 1" thickness fiberglass unless otherwise noted. The lining shall have a mat facing and shall meet the Life Safety Standards as established by NFPA 90A and 9B and conform to the requirements of ASTM C 1071.
- E. Insulate Kitchen exhaust ductwork per NFPA requirements (minimum 2" calcium silicate insulation) and all other agencies having jurisdiction.

2.2 DUCTWORK (OUTDOOR)

- A. All exposed ductwork shall be internally lined and sealed. All weatherproofing and external insulation by General Contractor.

- B. Make proper provision with ductwork support(s) so that insulation is not crushed. All exterior ductwork must be designed with adequate slope (watershed) to prevent ponding water.

OR

2.2 DUCTWORK (OUTDOOR)

- A. All exposed ductwork shall be internally lined and sealed, externally insulated with 2" thick closed-cell rigid board insulation and covered with fully adhered EPDM and acrylic coating.
- B. Make proper provision with ductwork support(s) so that insulation is not damaged. All exterior ductwork must be designed with adequate slope (watershed) to prevent ponding water.

2.3 PIPING / EQUIPMENT (INDOOR)

- A. All new or altered heating and chilled water system supply and return piping shall be covered with Manville Micro-Lok or equal approved fiberglass insulation with all service (factory applied) vapor retardant jacket. Seal with type H mastic.
- B. Fittings shall be insulated with same material and thickness as adjoining pipe insulation and shall be pre-molded fittings or mitre cut segmental insulation wired on. Over the insulation, apply a wrapper of OCF glass cloth sealed with type H mastic. Apply aluminum bands on pipe covering in addition to self-sealing feature.
- C. Insulation Material: Molded fibrous glass insulation, density not less than 4 lbs. per cubic foot.
- D. Insulation Thickness: Shall be in accordance with the latest edition of the New York State Energy Conservation Construction Code C403.11.
- E. Jacket and Finish: White flame retardant type, meeting all requirements of "Fire Hazard Classification" of NFPA, similar to "Fiberglass" Type FRJ, Insul-Coustic, Johns-Manville or approved equal.
- F. Insulation and Finishes for Fittings, Valves and Flanges
 1. Valves, fittings and flanges other than vapor seal insulation: Insulated in same manner and same thickness as piping in which installed.
 2. Use pre-molded sectional covering where available; otherwise use mitered segments of pipe covering.
 3. Obtain written approval prior to using other than molded sectional covering.
- G. Vapor seal Insulation for Valves, Fittings and Flanges: Same as above, except joints sealed with vapor barrier adhesive and wrapped with glass mesh tape. Each fitting shall be finished with two coats of vapor seal mastic adhesive.

- H. Jacket and Finishes: Exposed fittings - 6 oz. canvas jacket adhered with lagging adhesive.
- I. Concealed fittings: Standard weight canvas jacket adhered with lagging adhesive and with bands of 18 gauge copper coated steel - 2 bands at elbows, 3 at tee.
- J. Insulation at Pipe Hangers
 - 1. Where shields are specified at hangers on piping with fibrous glass covering, provide load bearing calcium silicate between shields and piping as follows:
 - a. For pipe covering without vapor barrier jacket, furnish at each shield 12" - long calcium silicate section with canvas section with canvas jacket continuous between shield and insulation.
 - b. For pipe covering with vapor barrier jacket, furnish at each shield 12" - long vapor barrier jacket section with section of fibrous glass replaced with section of calcium silicate. Vapor barrier jacket, continuous between shield and insulation for continuous vapor barrier.
- K. Condensate drain piping shall be insulated with 1/2" Armacell or approved equal closed cell insulation.
- L. Equipment Refrigerant piping shall be insulated with Armacell or approved equal closed cell insulation. Thickness shall be in accordance with the latest edition of the New York State Energy Conservation Code C403.11.
 - 1. Secure fibrous glass block or board insulation in place with wire or galvanized steel bands.
 - a. Small Areas: Secure insulation with 16 gauge wire on maximum 6" centers.
 - b. Large Areas: Secure insulation with 14 gauge wire or .015" thick by 1/2" wide galvanized steel bands on maximum 10" centers. Stagger insulation joints.
 - c. Irregular Surfaces: Where application of block or board insulation is not practical insulate with insulating cement built-up to same thickness as adjoining insulation.
 - 2. Fill joints, voids and irregular surfaces with insulating cement to a uniform thickness.
 - 3. Stretch wire mesh over entire insulated surface and secure to anchors with wire edges laced together.
 - 4. Apply finishing cement, total of 1/2" thick, in 1/4" thick coats. Trowel second coat to a smooth hard finish.
 - 5. Neatly bevel insulation around handholes, cleanouts, ASME stamp, manufacturer's nametag and catalog number.

- M. Insulated Covers for Pumps: Do not extend pump insulation beyond or interfere with stuffing boxes or interfere with adjustment and servicing of parts regular maintenance or operating attention.

2.4 PIPING (OUTDOOR)

- A. All supply and return piping shall be or approved equal covered with insulation in accordance with the latest edition of the New York Energy Conservation code C403.11.
- B. Insulation shall be calcium silicate with aluminum jacket.
- C. Calcium silicate insulation shall conform with ASTM C 533, Type I, and shall be Manville "Thermo-12" or approved equal.
- D. Insulation jacket shall be 0.016 inch thick aluminum for pipes 2-1/2 inches and larger, and 0.010 inch thick for pipes 2 inches and smaller with a built-in isolation felt. All seams and joints shall be weatherproof.
- E. Refrigerant piping shall be insulated with 1/2" Armacell or approved equal closed cell insulation.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.
- B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

- A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION 230430

SECTION 230440 - DAMPERS AND MISCELLANEOUS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 DAMPERS AND MISCELLANEOUS

- A. Furnish and install where shown on Drawings ARROW PIN-LOCK Dampers No. OBDPL-507 (Opposed) as manufactured by the Arrow Louver & Damper Corp. of Maspeth, NY 11378, or approved equal. Frames and blades to 1/8" extruded aluminum.
- B. Blades to be single unit PIN-LOCK design 6" wide, with the PIN-LOCK an integral section within the blade center axis. Frames to be a combination of 4" extruded aluminum channel and angle, with reinforcing bosses and groove inserts for vinyl seals.
- C. Pivot rods to be 1/2" diameter extruded aluminum, PIN-LOCK design interlocking into blade section. Bearings to be "Double-Sealed" type with Celcon inner bearing on rod riding in Merlon Polycarbonate outer bearing inserted in frame so that outer bearing cannot rotate.
- D. Blade linkage hardware is to be installed in angle or channel frame section out of air stream. All hardware to be of non-corrosive reinforced material or to be cadmium plated.
- E. Rod bearing to be designed for minimum air leakage by means of overlapping design and by extruded vinyl seals to fit into integral ribbed groove inserts in both frames and blades. All dampers in excess of 10 sq. ft. free area to have reinforced corners by means of gusset plates.
- F. Dampers shall be sized by the Control Manufacturer to properly control the flow of air and ensure minimum air stratification in mixing applications. Sizing shall be submitted for approval with information similar to that submitted on valve when sizing valve.

2.2 FIRE DAMPERS

- A. Dampers shall be multi blade construction UL labeled and be installed in accordance with UL 555, with breakaway connections. The units shall have stainless steel actuator springs with locking devices for horizontally mounted type.

2.3 COMBINATION FIRE / SMOKE DAMPERS

- A. Furnish and install at locations shown on Drawings, or as described in schedules, combination fire smoke dampers.

- B. Frame shall be a minimum of 16 gauge galvanized steel formed into a structural hat channel reinforced at corners for added strength. The blades shall be airfoil shaped single-piece hollow construction with 14 gauge equivalent thicknesses. Blade action shall be opposed. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame for long life. Galvanized bearing shall not be acceptable.
- C. Blade edge seals shall be silicone rubber and galvanized steel mechanically locked into blade edge (adhesive or clip fastened seals shall be acceptable) and shall withstand a minimum of 450 degrees F. (232 degrees C.) Jamb seals shall be non-corrosive stainless steel flexible metal compression type to further ensure smoke management.
- D. Each combination fire/smoke damper shall be classified for use for fire resistance ratings of less than 3 hours in accordance with UL Standard 555, and shall further be classified by Underwriters Laboratories as a Leakage Rated Damper for use in smoke control systems in accordance with the latest version of UL555S, and bear a UL label attesting to same. Damper manufacturer shall have tested, and qualified with UL, a complete range of damper sizes covering all dampers, required by this Specification. Testing and UL qualifying a single damper size is not acceptable. The leakage rating under UL555S shall be leakage Class I (4 c.f.m./sq. ft. at 1" w.g. and 8 c.f.m./ft. at 4" w.g.).
- E. As part of UL qualification, dampers shall have demonstrated a capacity to operate (to open and close) under HVAC system operating conditions, with pressures of at least 4" w.g. in the closed position, and 4000 f.p.m. air velocity in the open position.
- F. In addition to the leakage rating already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. (177 degrees C.). Appropriate electric actuators (equal to Ruskin model MA) shall be installed by the damper manufacturer at time of damper fabrication. Damper and actuator shall be supplied as a single entity, which meets all applicable UL555S qualifications for both dampers and actuators. Damper and actuator assembly shall be factory cycled 10 times to assure operation.
- G. Manufacturer shall provide factory assembled sleeve of 17" minimum length (Contractor to verify requirement). Factory supplied caulked sleeve shall be 20 gauge for dampers through 84" wide and 18 gauge above 84" wide.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

- B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

- A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION 230440

SECTION 230460 – AUTOMATIC TEMPERATURE CONTROLS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 QUALIFICATIONS OF BIDDER

- A. All bidders must be building automation contractors in the business of installing direct digital control building automation systems for a minimum of 10 years.
- B. All bidders must have an office in the within 50 miles of jobsite.
- C. All bidders must be authorized distributors or branch offices of the manufacturers specified.
- D. All bidders must have a trained staff of application Engineers, who have been certified by the manufacturer in the configuration, programming and service of the automation system.

1.2 SCOPE OF WORK

- A. This Contractor shall furnish an electronic system of temperature controls. The District has standardized on Andover. All submitted controls shall be directly compatible with existing hardware and software without patch panels or translators or any kind. The ATC Sub-Contractor shall be subject to the District's approval. Communications between the school is via their Ethernet LAN and remote access is via the Web or Local Intranet. The intent of this specification is to extend and interoperate with this system and to provide a peer-to-peer, networked, distributed control system for the temperature control work that is part of this project. The installed system will interface directly with the existing proprietary as well as open protocol systems, including the existing District network, dynamic color graphics software and programming software. The existing software and database will be modified to accept the new equipment being installed under this project to maintain integrity for centralized scheduling, trending, programming and alarming. PC Desktop icons that "link" to a separate EMS system are not acceptable. Any costs associated with connecting to the existing energy management system, including licensed software, programming, training etc. shall be part of the controls contractor's bid. The contractor must demonstrate their ability to perform the integration to the existing Schneider Electric systems prior to submittal acceptance and invoicing.
- B. Only licensed software toolsets will be acceptable for integration work. All systems as described in the sequence of operation will be shown via dynamic Web based graphics with all pertinent system alarms for proper operation and maintenance. The use of separate PC workstations, gateways, metalinks, replacement of existing controllers and control devices and additional software graphic packages to accomplish this integration will not be accepted.

- C. Prospective bidders shall visit the School District Buildings to verify existing DDC controls equipment and Contractor's ability to be compatible with these controls before bid. Contact the Schools Supt. of Buildings and Grounds for details. Contractor shall provide Web based graphics for controlled equipment that matches the functionality and appearance of the graphics already in use on the existing system. Contractor shall configure graphic display to meet Owner and Engineer requirements.
- D. The Temperature Controls Contractor (TCC) shall provide each of the following portions of the complete EMCS as a standalone system that can communicate with any other DDC system which is following the same protocol.
1. Operator Workstations: Reuse existing OWS's, software and Databases in the district and provide guaranteed seamless two way communications via the Internet and District LAN, including full control, with both all existing DDC systems currently under control and the DDC system provided as a part of this project.
 2. The OWS's shall monitor, display, and control information from the DDC systems through one software package. Rebooting of the OWS to access the existing building's multiple systems is not acceptable. Use of separate ": Icons" to access multiple DDC systems is not acceptable. The existing database shall be modified to incorporate the work of this project.
 3. The system OWS's shall meet the hardware and performance requirements of this specification.
 4. The OWS's shall allow customization of the system as described in this specification.
 5. The OWS's shall:
 - a. Provide new color graphic control screens for all equipment provided or modified as part of this project, as outlined below and on the drawings.
 - b. Allow operators to view and work (read and write) all DDC points associated with all DDC equipment provided or modified as part of this project, including all existing DDC points.
 - c. Allow for custom graphics and/or control programming generation for any existing or new equipment.
 - d. Provide seamless continuity of graphics and existing functionality for all existing Owner's equipment currently under DDC control.
- E. All proposed controls contractors that intend on interoperating with the existing DDC system utilizing DDC controls other than those presently installed in the district, shall submit a Technical Proposal, complete with the diagrams, Specifications Compliance Reports, product information, and supporting documentation outlined below. The technical proposal will be utilized to evaluate the methodology that will be used to implement the interoperation and integration of the new controls of this project into the existing district wide energy management system. It will also be used as a basis for

vendor qualification on for the project. Arrange the Technical Proposal in order of the specification article numbers.

- F. Provide a list of local jobs (three minimum) of similar type and size the bidder has installed, utilizing the products proposed for this project, with owner's representatives' names and telephone numbers for reference. This list should directly reflect:
1. Projects that include direct integration to third party microprocessor controllers of the type specified within the scope where an integration and interoperation of Lon Works controls has been successfully achieved between two different manufacturers' controls systems.
 2. EMCS network wiring diagram showing interconnection of all panels, workstations, system printer(s) etc. A diagram describing system architecture for this project with product code numbers for workstation, network controllers, application specific controllers, transducers, sensors, communication network, etc.
- G. Provide information on owner training provided as part of the bid package as well as additional opportunities and factory schools available with associated cost. Include details of operator HVAC Training System as specified herein.
- H. Specification Compliance Report. Provide specification compliance report that addresses every paragraph within this specification section utilizing an outline format, as follows:
1. Comply-bid package complies without exception;
 2. Exception – bid package meets the functional intent, but not the letter of the specification. For each paragraph that an exception is taken, identify all deviations from what is specified in the given paragraph and provide a description of what is excluded, what is included, and how the contractor intends to meet the functional intent;
 3. Does not comply – bid package cannot meet specified function and will not be provided.
 4. For all paragraphs in this specification section, indicates as "Comply" or "Exception" or "Does not comply". Provide and reference factory product documentation to substantiate compliance.
- I. Provide a statement that all products used on this project is of current manufactures and are readily available through multiple distribution channels. Products in "field testing" status are not acceptable.
- J. The BAS Contractor shall review and study all HVAC Drawings and the entire Specification to familiarize himself with the equipment and system operation and to verify the quantities and types of dampers, operators, alarms, etc. to be provided.
- K. Prior to commencement of schedule programming meet with Owner to discuss block/individual scheduling of system/equipment and alarm protocols. Review equipment designations and graphics screens to be provided. Take minutes of this meeting and issue them to the Construction Manager/Owner's representative.

- J. All temperature control wiring regardless of voltage shall be done by this Contractor. This shall include power wiring of control panels/components from available spare circuits in electrical panels. The automatic temperature control manufacturer shall provide wiring diagrams, field supervision and one (1) year guarantee on the installed DDC system and three (3) year factory warranty on all control equipment manufactured by the DDC manufacturer.
 - M. Thermostats, temperature sensors, heating control devices, etc. are indicated on the Drawings in general. Provide any additional devices required to carry out project intent as herein described.
 - N. Thermostats/Temperature sensors in areas subject to vandalism shall have in addition separately mounted extra heavy guards. Submit sample.
 - O. Contractor shall include all new heating control devices, thermostats, etc. indicated on Drawings or that is part of a new system.
 - P. Contractor shall furnish all necessary electrical controls, motor starters, switches, etc. for proper operation of equipment furnished by him under this Contract, and as herein noted.
 - Q. Point and component lists are to be used as a guide. If the sequence of operation requires additional points/control devices, this Contractor shall be responsible for providing same.
 - R. All control system components installed shall be manufactured by the DDC system manufacturer.
 - S. Communications cabling shall be run in hallways above hung ceiling with plenum cable and wiremold where exposed.
 - T. Removals shall include switches, relays, electric components not required for the new intent. Do not leave behind items with no function. Provide appropriate blanking plates/patching where removals occur in finished spaces.
 - U. Provide services and manpower necessary for commissioning of system in coordination with the HVAC Contractor, Balancing Contractor and Owner's representative.
- 1.3 SOFTWARE CODE
- A. Owner shall be furnished with a complete, hard-bound copy of all installed software code. Final payment shall be contingent upon this requirement being met.
- 1.4 CODE COMPLIANCE
- A. Provide components and ancillary equipment, which are UL-916 listed and labeled.
 - B. All equipment or piping used in conditioned air streams, spaces or return air plenums shall comply with NFPA 90A Flame/Smoke/Fuel contribution rating of 25/50/0 and all applicable building codes or requirements.

- C. All wiring shall conform to the National Electrical Code.
- D. Comply with FCC rules, Part 15 regarding Class A radiation for computing devices and low power communication equipment operating in commercial environments.
- E. Comply with FCC, Part 68 rules for telephone modems and data sets.

1.5 SUBMITTALS

- A. All shop drawings shall be prepared in Visio Professional or AutoCAD software. In addition to the Drawings, the Contractor shall furnish a CD containing the identical information. Drawings shall be B size or larger.
- B. Shop drawings shall include a riser diagram depicting locations of all controllers and workstations, with associated network wiring. Also included shall be individual schematics of each mechanical system showing all connected points with reference to their associated controller. Typical will be allowed where appropriate.
- C. Submittal data shall contain manufacturer's data on all hardware and software products required by the Specification. Valve damper and airflow station schedules shall indicate size, configuration, capacity and location of all equipment.
- D. Software submittals shall contain narrative descriptions of sequences of operation, program listings, point lists, and a complete description of the graphics, reports, alarms and configuration to be furnished with the workstation software. Information shall be bound or in a three ring binder with an index and tabs.
- E. Submit submittal data and shop drawings to the Engineer for review prior to ordering or fabrication of the equipment. The Contractor prior to submitting shall check all Documents for accuracy.
- F. The Engineer will make corrections, if required, and return to the Contractor. The Contractor will then resubmit with the corrected or additional data. This procedure shall be repeated until all corrections are made to the satisfaction of the Engineer and the submittals are fully approved.

1.6 SYSTEM STARTUP AND COMMISSIONING

- A. Each point in the system shall be tested for both hardware and software functionality. In addition, each mechanical and electrical system under control of the BAS will be tested against the appropriate sequence of operation specified herein. Successful completion of the system test shall constitute the beginning of the commissioning phase. A written report will be submitted to the Owner indicating that the installed system has been started and balanced in accordance with the Drawings and Specifications.
- B. The ATC Contractor shall commission and set in operating condition all major equipment and systems, such as heating, DX cooling, heat recovery and all air handling systems, in the presence of the equipment manufacturer's representatives, as applicable, and the Owner and Architect's representatives.

- C. The ATC Contractor shall provide all manpower and engineering services required to assist the HVAC Contractor and Balancing Contractor in testing, adjusting, and balancing all systems in the building Scope of Work. The Contractor shall have a trained technician available on request during the balancing of the systems. The Contractor shall coordinate all requirements to provide a complete air balance with the Balancing Contractor and shall include all labor and materials in his Contract.

1.7 OPERATING AND MAINTENANCE MANUALS

- A. The operation and maintenance manuals shall contain all information necessary for the operation, maintenance, replacement, installation and parts procurement for the entire system. This documentation shall include specific part numbers and software versions and dates. A complete list of recommended spare parts shall be included with the lead-time and expected frequency of use of each part clearly identified.
- B. Following project completion and testing, the Contractor will submit As-Built Drawings reflecting the exact installation of the system. The as-built documentation shall also include a copy of all application software both in written form and on CD.

1.8 WARRANTY

- A. The Contractor shall provide system warranty for 12 months after system acceptance or beneficial use by the Owner. During the warranty period, the Contractor shall be responsible for all necessary revisions to the software as required to provide a complete and workable system consistent with the letter and intent of the Sequence of Operation section of the Specification.
- B. Updates to the manufacturer's software shall be provided at no charge during the warranty period.

1.9 SPECIFICATION NOMENCLATURE

- A. Acronyms used in this specification are as follows:
 - 1. EMCS Energy Management and Control System
 - 2. NAC Network Area Controller
 - 3. IDC Interoperable Digital Controller
 - 4. FUI Full User Interface
 - 5. BUI Browser User Interface
 - 6. POT Portable Operator's Terminal
 - 7. PMI Power Measurement Interface
 - 8. DDC Direct Digital Controls
 - 9. LAN Local Area Network
 - 10. WAN Wide Area Network
 - 11. OOT Object Oriented Technology
 - 12. PICS Product Interoperability Compliance Statement

PART 2 - PRODUCTS

2.1 GENERAL

- A. The Energy Management Control System (EMCS) shall be comprised of a network of interoperable, stand-alone digital controllers, a computer system, graphical user interface software, portable operator terminals, printers, network devices and other devices as specified herein.
- B. The installed system shall provide secure password access to all features, functions and data contained in the overall EMCS.

2.2 OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURES

- A. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system with the capability to integrate Lon Works and Schneider Electric Network 8000 technology communication protocols in one open, interoperable system.
- B. The programming computer software shall employ object-oriented technology (OOT) for representation of all data and control devices within the system. In addition, adherence to industry standards including ANSI / ASHRAE™ Standard 135-1995, to assure interoperability between all system components is required. For each Lon Works device that does not have Lon Work certification, the device supplier must provide an XIF file for the device. All components and controllers supplied under this contract shall be true “peer-to-peer” communicating devices. Components or controllers requiring “polling” by a host to pass data shall not be acceptable.
- C. The supplied system must incorporate the ability to access all data using Java enabled browsers without requiring proprietary operator interface and configuration programs. An Open Database Connectivity (ODBC) or Structured Query Language (SQL) compliant server database is required for all system database parameter storage. This data shall reside on a supplier-installed server for all database access. Systems requiring proprietary database or proprietary user interface programs shall not be acceptable.
- D. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer’s internal Intranet network. Systems employing a “flat” single tiered architecture shall not be acceptable.
 - 1. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 5 seconds for network connected user interfaces.
 - 2. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 60 seconds for remote or dial-up connected user interfaces.

2.3 NETWORKS

- A. The Local Area Network (LAN) shall be either a 10 or 100 Megabits/sec Ethernet network supporting, Java, XML, HTTP, and CORBA IIOP for maximum flexibility for integration of building data with enterprise information systems and providing support for multiple Network Area Controllers (NACs), Browser User Interfaces (BUIs) and/or Full User Interfaces (FUIs).
- B. Local area network minimum physical and media access requirements:
 - 1. Ethernet; IEEE standard 802.3
 - 2. Cable; 10 Base-T, UTP-8 wire, category 5
 - 3. Minimum throughput; 10 Mbps, with ability to increase to 100 Mbps

2.4 NETWORK ACCESS

- A. Remote Access
 - 1. For Local Area Network installations, provide access to the LAN from a remote location, via the Internet. The owner shall provide a connection to the Internet to enable this access via high-speed cable modem, asynchronous digital subscriber line (ADSL) modem, and ISDN line, T1 Line or via the customer's Intranet to a corporate server providing access to an Internet Service Provider (ISP). Owner agrees to pay monthly access charges for connection and ISP.
 - 2. Where no Local Area Network exists, EMCS supplier shall provide the following:
 - a. 8 Port Ethernet hub (3Com, or equal)
 - b. Ethernet router (Cisco or equal)
 - 3. The owner shall provide a connection to the Internet to enable this access via high-speed cable modem, asynchronous digital subscriber line (ADSL) modem, ISDN line or T1 Line. Owner agrees to pay monthly access charges for connection and ISP.

2.5 NETWORK AREA CONTROLLER (NAC)

- A. The Network Area Controller (NAC) shall provide the interface between the LAN or WAN and the field control devices and provide global supervisory control functions over the control devices connected to the NAC. It shall be capable of executing application control programs to provide:
 - 1. Calendar functions
 - 2. Scheduling
 - 3. Trending
 - 4. Alarm monitoring and routing
 - 5. Time synchronization
 - 6. Integration of Lon Works controller data
 - 7. Network Management functions for all Lon Works based devices

- B. The Network Area Controller must provide the following hardware features as a minimum:
1. One Ethernet Port -10 / 100 Mbps.
 2. One RS-232 port.
 3. One Lon Works Interface Port – 78KB FTT-10A.
 4. Battery Backup.
 5. Flash memory for long term data backup (If battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1 gigabyte storage capacity)
 6. The NAC must be capable of operation over a temperature range of 0 to 55°C.
 7. The NAC must be capable of withstanding storage temperatures of between 0 and 70°C.
 8. The NAC must be capable of operation over a humidity range of 5 to 95% RH, non-condensing.
- C. The NAC shall provide multiple user access to the system and support for ODBC or SQL. A database resident on the NAC shall be an ODBC-compliant database or must provide an ODBC data access mechanism to read and write data stored within it.
- D. The NAC shall support standard Web browser access via the Intranet/Internet. It shall support a minimum of 16 simultaneous users.
- E. Event Alarm Notification and Actions
1. The NAC shall provide alarm recognition, storage; routing, management, and analysis to supplement distributed capabilities of equipment or application specific controllers.
 2. The NAC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via dial-up, telephone connection, or wide-area network.
 3. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but limited to:
 - a. To alarm
 - b. Return to normal
 - c. To fault
 4. Provide for the creation of an unlimited number of alarm classes for the purpose of routing types and or classes of alarms, i.e.: security, HVAC, Fire, etc.
 5. Provide timed (schedule) routing of alarms by class, object, group, or node.
 6. Provide alarm generation from binary object “runtime” and /or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.
- F. Control equipment and network failures shall be treated as alarms and annunciated.
- G. Alarms shall be annunciated in any of the following manners as defined by the user:
1. Screen message text

2. Email of the complete alarm message to multiple recipients. Provide the ability to route and email alarms based on:
 - a. Day of week
 - b. Time of day
 - c. Recipient
 3. Pagers via paging services that initiate a page on receipt of email message
 4. Graphic with flashing alarm object(s)
 5. Printed message, routed directly to a dedicated alarm printer
- H. The following shall be recorded by the NAC for each alarm (at a minimum):
1. Time and date
 2. Location (building, floor, zone, office number, etc.)
 3. Equipment (air handler #, access way, etc.)
 4. Acknowledge time, date, and user who issued acknowledgement.
 5. Number of occurrences since last acknowledgement.
- I. Alarm actions may be initiated by user defined programmable objects created for that purpose.
- J. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.
- K. A log of all alarms shall be maintained by the NAC and/or a server (if configured in the system) and shall be available for review by the user.
- L. Provide a “query” feature to allow review of specific alarms by user-defined parameters.
- M. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.
- N. An Error Log to record invalid property changes or commands shall be provided and available for review by the user.
- 2.6 DATA COLLECTION AND STORAGE
- A. The NAC shall have the ability to collect data for any property of any object and store this data for future use.
- B. The data collection shall be performed by log objects, resident in the NAC that shall have, at a minimum, the following configurable properties:
1. Designating the log as interval or deviation.
 2. For interval logs, the object shall be configured for time of day, day of week and the sample collection interval.
 3. For deviation logs, the object shall be configured for the deviation of a variable to a fixed value. This value, when reached, will initiate logging of the object.

4. For all logs, provide the ability to set the maximum number of data stores for the log and to set whether the log will stop collecting when full, or rollover the data on a first-in, first-out basis.
 5. Each log shall have the ability to have its data cleared on a time-based event or by a user-defined event or action.
- C. All log data shall be stored in a relational database in the NAC and the data shall be accessed from a server (if the system is so configured) or a standard Web Browser.
- D. All log data, when accessed from a server, shall be capable of being manipulated using standard SQL statements.
- E. All log data shall be available to the user in the following data formats:
1. HTML
 2. XML
 3. Plain Text
 4. Comma or tab separated values
- F. Systems that do not provide log data in HTML and XML formats at a minimum shall not be acceptable.
- G. The NAC shall have the ability to archive its log data either locally (to itself), or remotely to a server or other NAC on the network. Provide the ability to configure the following archiving properties, at a minimum:
1. Archive on time of day.
 2. Archive on user-defined number of data stores in the log (buffer size).
 3. Archive when log has reached its user-defined capacity of data stores.
 4. Provide ability to clear logs once archived.

2.7 AUDIT LOG

- A. Provide and maintain an Audit Log that tracks all activities performed on the NAC. Provide the ability to specify a buffer size for the log and the ability to archive log based on time or when the log has reached its user-defined buffer size. Provide the ability to archive the log locally (to the NAC), to another NAC on the network, or to a server. For each log entry, provide the following data:
1. Time and date
 2. User ID
 3. Change or activity: i.e., Change setpoint, add or delete objects, commands, etc.

2.8 DATABASE BACKUP AND STORAGE

- A. The NAC shall have the ability to automatically backup its database. The database shall be backed up based on a user-defined time interval.
- B. Copies of the current database and, at the most recently saved database shall be stored in the NAC. The age of the most recently saved database is dependent on the user-defined database save interval.

- C. The NAC database shall be stored, at a minimum, in XML format to allow for user viewing and editing, if desired. Other formats are acceptable as well, as long as XML format is supported.

2.9 INTEROPERABLE DIGITAL CONTROLLER (IDC)

- A. Controls shall be microprocessor based Interoperable Lon Mark™ or Lon Works Controllers (IDC). Where possible, all Interoperable Digital Controllers shall bear the applicable Lon Mark™ interoperability logo on each product delivered.
- B. HVAC control shall be accomplished using Lon Mark™ based devices where the application has a Lon Mark profile defined. Where Lon Mark devices are not available for a particular application, devices based on Lon Works shall be acceptable. For each Lon Works device that does not have Lon Mark certification, the device supplier must provide an XIF file for the device. Publicly available specifications for the Applications Programming Interface (API) must be provided for each Lon Works / Lon Mark controller defining the programming or setup of each device. All programming, documentation and programming tools necessary to set up and configure the supplied devices per the specified sequences of operation shall be provided.
- C. The Lon Works network trunk shall be run to the nearest Network Area Controller (NAC). A maximum of 126 devices may occupy any one Lon Works trunk and must be installed in buss architecture using the appropriate trunk termination device. All Lon Works and Lon Mark devices must be supplied using FTT-10A Lon Works communications transceivers.
- D. The Network Area Controller will provide all scheduling, alarming, trending, and network management for the Lon Mark / Lon Works based devices.
- E. The IDCs shall communicate with the NAC at a baud rate of not less than 78.8K baud. The IDC shall provide LED indication of communication and controller performance to the technician, without cover removal.
- F. All IDCs shall be fully application programmable and shall at all times maintain their LONMARK certification. Controllers offering application selection only (non-programmable), require a 10% spare point capacity to be provided for all applications. All control sequences within or programmed into the IDC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.
- G. The supplier of any programmable IDC shall provide one copy of the manufacturer's programming tool, with documentation, to the owner.

2.10 FULL USER INTERFACE SOFTWARE (EXISTING)

- A. Operating System: The FUI shall run on Microsoft Windows NT Workstation 4.0, Service Pack 4 or later.
- B. The FUI shall employ browser-like functionality for ease of navigation. It shall include a tree view (similar to Windows Explorer) for quick viewing of, and access to, the hierarchical structure of the database. In addition, menu-pull downs, and toolbars shall employ buttons, commands and navigation to permit the operator to perform tasks with a

minimum knowledge of the HVAC Control System and basic computing skills. These shall include, but are not limited to, forward/backward buttons, home button, and a context sensitive locator line (similar to a URL line), that displays the location and the selected object identification.

- C. Real-Time Displays. The FUI, shall at a minimum, support the following graphical features and functions:
1. Graphic screens shall be developed using any drawing package capable of generating a GIF, BMP, or JPG file format. Use of proprietary graphic file formats shall not be acceptable. In addition to, or in lieu of a graphic background, the FUI shall support the use of scanned pictures.
 2. Graphic screens shall have the capability to contain objects for text, real-time values, animation, color spectrum objects, logs, graphs, HTML or XML document links, schedule objects, hyperlinks to other URL's, and links to other graphic screens.
 3. Graphics shall support layering and each graphic object shall be configurable for assignment to a layer. A minimum of six layers shall be supported.
 4. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.
 - a. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
 - b. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.
 5. Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.
 6. Adjustments to analog objects, such as set points, shall be done by right-clicking the selected object and using a graphical slider to adjust the value. No entry of text shall be required.
- D. System Configuration: At a minimum, the FUI shall permit the operator to perform the following tasks, with proper password access:
1. Create, delete or modify control strategies.
 2. Add/delete objects to the system.
 3. Tune control loops through the adjustment of control loop parameters.
 4. Enable or disable control strategies.
 5. Generate hard copy records or control strategies on a printer.
 6. Select points to be alarmable and define the alarm state.
 7. Select points to be trended over a period of time and initiate the recording of values automatically.
- E. On-line Help: Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information

shall be available through the use of hypertext. All system documentation and help files shall be in HTML format.

- F. On-line Documentation: Provide a context sensitive, on-line documentation system to assist the operator in operation and trouble shooting of each integrated system. On-line help shall be available for all applications and shall provide the relevant data for that particular monitoring screen. As a minimum, provide a link to the Sequence of Operation, input/output summary, and cut sheets in either Adobe Acrobat™ or HTML format.
- G. Security: Each operator shall be required to log on to that system with a username and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.
- H. System Diagnostics: The system shall automatically monitor the operation of all workstations, printers, modems, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.
- I. Alarm Console
 - 1. The system will be provided with a dedicated alarm window or console. This window will notify the operator of an alarm condition and allow the operator to view details of the alarm and acknowledge the alarm. The use of the Alarm Console can be enabled or disabled by the system administrator.
 - 2. When the Alarm Console is enabled, a separate alarm notification window will supersede all other windows on the desktop and shall not be capable of being minimized or closed by the operator. This window will notify the operator of new alarms and un-acknowledged alarms. Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable.

2.11 BROWSER USER INTERFACE SOFTWARE (EXISTING)

- A. The system shall be capable of supporting an unlimited number of clients using a standard Web browser such as Internet Explorer™ or Netscape Navigator™. Systems requiring additional software (to enable a standard Web browser) to be resident on the client machine, or manufacture-specific browsers shall not be acceptable.
- B. The Web browser software shall run on any operating system and system configuration that is supported by the Web browser. Systems that require specific machine requirements in terms of processor speed, memory, etc., in order to allow the Web browser to function with the EMCS, shall not be acceptable.

- C. The Web browser shall provide the same view of the system, in terms of graphics, schedules, calendars, logs, etc., and provide the same interface methodology as is provided by the Full User Interface. Systems that require different views or that require different means of interacting with objects such as schedules, or logs, shall not be permitted.
- D. The Web browser client shall support at a minimum, the following functions:
1. User log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using Java authentication and encryption techniques to prevent unauthorized access shall be implemented.
 2. Graphical screens developed for the FUI shall be the same screens used for the Web browser client. Any animated graphical objects supported by the FUI shall be supported by the Web browser interface.
 3. HTML programming shall not be required to display system graphics or data on a Web page. HTML editing of the Web page shall be allowed if the user desires a specific look or format.
 4. Storage of the graphical screens shall be in the Network Area Controller (NAC), without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.
 5. Real-time values displayed on a Web page shall update automatically without requiring a manual "refresh" of the Web page.
 6. Users shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:
 - a. Modify common application objects, such as schedules, calendars, and set points in a graphical manner.
 - i. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
 - ii. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.
 - b. Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.
 - c. View logs and charts
 - d. View and acknowledge alarms
 7. The system shall provide the capability to specify a user's (as determined by the log-on user identification) home page. Provide the ability to limit a specific user to a pre-defined home page. From the home page, links to other views, or pages in the system shall be possible, if allowed by the system administrator.
 8. Graphic screens on the Web Browser client shall support hypertext links to other locations on the Internet or on Intranet sites, by specifying the Uniform Resource Locator (URL) for the desired link.

2.12 SYSTEM PROGRAMMING

- A. The Full User Interface software (FUI) shall provide the ability to perform system programming and graphic display engineering as part of a complete software package.

Access to the programming functions and features of the GUI shall be through password access as assigned by the system administrator.

- B. A library of control, application, and graphic objects shall be provided to enable the creation of all applications and user interface screens. Applications are to be created by selecting the desired control objects from the library, dragging or pasting them on the screen, and linking them together using a built in graphical connection tool. Completed applications may be stored in the library for future use. Graphical User Interface screens shall be created in the same fashion. Data for the user displays is obtained by graphically linking the user display objects to the application objects to provide "real-time" data updates. Any real-time data value or object property may be connected to display its current value on a user display. Systems requiring separate software tools or processes to create applications and user interface display shall not be acceptable.

Programming Methods:

C. Programming Methods

1. Provide the capability to copy objects from the supplied libraries, or from a user-defined library to the user's application. Objects shall be linked by a graphical linking scheme by dragging a link from one object to another. Object links will support one-to-one, many-to-one, or one-to-many relationships. Linked objects shall maintain their connections to other objects regardless of where they are positioned on the page and shall show link identification for links to objects on other pages for easy identification. Links will vary in color depending on the type of link; i.e., internal, external, hardware, etc.
2. Configuration of each object will be done through the object's property sheet using fill-in the blank fields, list boxes, and selection buttons. Use of custom programming, scripting language, or a manufacturer-specific procedural language for configuration will not be accepted.
3. The software shall provide the ability to view the logic in a monitor mode. When on-line, the monitor mode shall provide the ability to view the logic in real time for easy diagnosis of the logic execution. When off-line (debug), the monitor mode shall allow the user to set values to inputs and monitor the logic for diagnosing execution before it is applied to the system.
4. All programming shall be done in real-time. Systems requiring the uploading, editing, and downloading of database objects shall not be allowed.
5. The system shall support object duplication within a customer's database. An application, once configured, can be copied and pasted for easy re-use and duplication. All links, other than to the hardware, shall be maintained during duplication.

2.13 OBJECT LIBRARIES

- A. A standard library of objects shall be included for development and setup of application logic, user interface displays, system services, and communication networks.

- B. The objects in this library shall be capable of being copied and pasted into the user's database and shall be organized according to their function. In addition, the user shall have the capability to group objects created in their application and store the new instances of these objects in a user-defined library.
- C. In addition to the standard libraries specified here, the supplier of the system shall maintain an on-line accessible (over the Internet) library, available to all registered users to provide new or updated objects and applications as they are developed.
- D. The object library shall include objects to support the integration of devices connected to the Network Area Controller (NAC). At a minimum, provide the following as part of the standard library included with the programming software:
 - 1. Lon Mark/Lon Works devices. These devices shall include, but not be limited to, devices for control of HVAC, lighting, access, and metering. Provide Lon Mark manufacturer-specific objects to facilitate simple integration of these devices. All network variables defined in the Lon Mark profile shall be supported. Information (type and function) regarding network variables not defined in the Lon Mark profile shall be provided by the device manufacturer.
 - 2. For devices not conforming to the Lon Mark standard, provide a dynamic object that can be assigned to the device based on network variable information provided by the device manufacturer. Device manufacturer shall provide an XIF file and documentation for the device to facilitate device integration.

2.14 LONWORKS NETWORK MANAGEMENT

- A. The Full User Interface software (FUI) shall provide a complete set of integrated Lon Works network management tools for working with Lon Works networks. These tools shall manage a database for all Lon Works devices by type and revision and shall provide a software mechanism for identifying each device on the network. These tools shall also be capable of defining network data connections between Lon Works devices, known as "binding". Systems requiring the use of third party Lon Works network management tools shall not be accepted.
- B. Network management shall include the following services: device identification, device installation, device configuration, device diagnostics, device maintenance and network variable binding.
- C. The Network configuration tool shall also provide diagnostics to identify devices on the network, to reset devices, and to view health and status counters within devices.
- D. These tools shall provide the ability to "learn" an existing Lon Works network, regardless of what network management tool(s) were used to install the existing network, so that existing Lon Works devices and newly added devices are part of a single network management database.
- E. The network management database shall be resident in the Network Area Controller (NAC), ensuring that anyone with proper authorization has access to the network management database at all times. Systems employing network management

databases that are not resident, at all times, and within the control system shall not be accepted.

2.15 OTHER CONTROL SYSTEM HARDWARE

- A. Motorized Control Dampers: Coordinate with the other trades for the exact quantity, size and location of all dampers. Dampers shall be black enamel finish or galvanized, with nylon bearings. Blade edge and tip seals shall be included for all dampers. Blades shall be 16-gauge minimum and 6 inches wide maximum and frame shall be of welded channel iron. Dampers with both dimensions less than 18 inches may have strap iron frames. Ruskin CD-46 or Equal.
- B. Control Damper and Valve Actuators: Coordinate with other trades for exact quantity, size and location of all dampers. Provide all dampers unless Two-position or proportional electric actuators shall be direct-mount type. All actuators shall be spring return type. Provide one actuator per damper minimum.
- C. Control Valves: Control valves shall be 2-way, or 3-way pattern as shown constructed for tight shutoff and shall operate satisfactorily against system pressures and differentials. Two-position valves shall be 'line' size. Proportional control valves shall be sized for a maximum pressure drop of 5.0 psi at rated flow (except as may be noted on the drawings). Valves with sizes up to and including 2 inches shall be "screwed" configuration and 2-1/2 inch and larger valves shall be "flanged" configuration. Electrically controlled valves shall include spring return type actuators sized for tight shut-off against system pressures and furnished with integral switches for indication of valve position (open-closed). Three-way butterfly valves, when utilized, shall include a separate actuator for each butterfly segment.
- D. Wall Mount Room Thermostats: Each room thermostat shall provide temperature indication to the digital controller; provide the capability for a software-limited set point adjustment and operation override capability. An integral LCD shall annunciate current room temperature and set point as well as override status indication. In addition, the thermostat shall include a port for connection of the portable operator's terminal described elsewhere in this specification.
- E. Duct Mount, Pipe Mount and Outside Air Temperature Sensors: 10,000-ohm thermistor temperature sensors with an accuracy of $\pm 0.2^{\circ}\text{C}$. Outside air sensors shall include an integral sun shield.
- F. Current Sensitive Switches: Solid state, split core current switch that operates when the current level (sensed by the internal current transformer) exceeds the adjustable trip point. Current switch to include an integral LED for indication of trip condition and a current level below trip set point.
- G. Water Flow Meters (when required): Water flow meters shall be axial turbine style flow meters which translate liquid motion into electronic output signals proportional to the flow sensed. Flow sensing turbine rotors shall be non-metallic and not impaired by magnetic drag. Flow meters shall be 'insertion' type complete with 'hot-tap' isolation valves to

enable sensor removal without water supply system shutdown. Accuracy shall be $\pm 2\%$ of actual reading from 0.4 to 20 feet per second flow velocities.

- H. Temperature Control Panels: Furnish temperature control panels of code gauge steel with locking doors for mounting all devices as shown. Control panels shall meet all requirements of Title 24, California Administrative Code. All electrical devices within a control panel shall be factory wired. All external wiring shall be connected to terminal strips mounted within the panel. Provide engraved phenolic nameplates identifying all devices mounted on the face of control panels. A complete set of 'as-built' control drawings (relating to the controls within that panel) shall be furnished within each control panel.

2.16 INPUT DEVICES

- A. System accuracy of sensed conditions shall be as follows:
1. $\pm .5^{\circ}\text{F}$ for space temperature in the $0\text{-}130^{\circ}\text{F}$ range
 2. $\pm .5^{\circ}\text{F}$ for duct temperatures in the $40\text{-}130^{\circ}\text{F}$ range
 3. $\pm 1.0^{\circ}\text{F}$ for outside air temperatures in the $(-30)\text{-}230^{\circ}\text{F}$ range
 4. $\pm 1.0^{\circ}\text{F}$ for water temperatures in the $30\text{-}230^{\circ}\text{F}$ range
 5. $\pm .1$ inch for filter status differential over a $0\text{-}2$ inch range
- B. The system shall maintain the specified analog end-to-end accuracy throughout the warranty period from sensor to controller readout.
- C. Packaging: Sensors (transducers) will be appropriately packaged for the location.
1. Architectural housing for space mounting.
 2. Weatherproof/sunshield housing for outdoors.
 3. Thermal well housing for water applications.
 4. Protective housing for duct mounting.
- D. Environmental Ratings - The sensor/transducer shall be selected to withstand ambient conditions where:
1. Moisture or condensation is a factor.
 2. Vibration exists from ductwork, equipment, etc.
 3. Reasonably expected transient conditions exist for temperatures, pressures, humidities, etc. outside the normal sensing range.
- E. Temperature Sensors
1. Temperature sensors will be by the use of thermistors (10K ohm at 77°F) or RTDs (PT100 curve).

2. Sensors in the return or discharge duct shall be of the single point type. Sensors in the mixed air will be of the average type.
3. Thermowells shall be brass or stainless steel for non-corrosive fluids below 250°F and 300 series stainless steel for all other applications.
4. Room temperature sensors: Sensing element only.

F. Digital Sensors

1. All digital inputs will be provided by dry contacts. The contacts will be wired normally open or normally closed as required.
2. Motor status (pumps, fans, etc.) shall be determined by current-operated switch.

2.17 OUTPUT DEVICES

A. The use of multiplexers will not be accepted.

B. Relays and Contactors

1. All digital outputs will be electrically isolated from the digital controller by interface relays.
2. Field relays shall have a minimum life of 1 million cycles without failure.
3. Contactors shall have a minimum life of ten thousand cycles without failure.

2.18 ACTUATORS

A. Standard manufacturer damper and valve actuators, proportional or two-position as required, sized to properly operate device. Damper actuators shall be of the direct coupled type, Belimo or equal.

2.19 WIRING AND CONDUIT

- A. Where different wiring classes terminate within the same enclosure, maintain clearances and install barriers per the National Electric Code.
- B. Where wiring is required to be installed in conduit, EMT shall be used. Conduit shall be minimum 1/2 inch galvanized EMT. Set screw fittings are acceptable for dry interior locations. Watertight compression fittings shall be used for exterior locations and interior locations subject to moisture. Provide conduit seal-off fitting where exterior conduits enter the building or between areas of high temperature/moisture differential.
- C. Flexible metallic conduit (max. 3 feet) shall be used for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduit shall be use in exterior locations and interior locations subject to moisture.
- D. Junction boxes shall be provided at all cable splices, equipment terminations, and transitions from EMT to flexible conduit. Interior dry location J-boxes shall be galvanized pressed steel, nominal four-inch square with blank cover. Exterior and damp location JH-boxes shall be cast alloy FS boxes with threaded hubs and gasketed covers.

- E. Where the space above the ceiling is a supply or return air plenum, the wiring shall be plenum rated. Teflon wiring can be run without conduit above suspended ceilings. EXCEPTION: Any wire run in suspended ceilings that is used to control outside air dampers or to connect the system to the fire alarm system shall be in conduit.

2.20 ENCLOSURES

- A. All controllers and field interface panels shall be mounted in new enclosures unless otherwise stated in this specification.
- B. All outside mounted enclosures shall meet the NEMA-4 rating.
- C. Wiring within all enclosures shall be run in plastic track. Wiring within controllers shall be wrapped and secured.

2.21 CONTROL VALVES

- A. Control Valves: Factory fabricated, of type, body material, and pressure class indicated. Where type or body material is not indicated, make selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature rating of piping system.
- B. Globe Pattern: As follows:
 - 1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity re-packable under pressure.
 - 2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
 - 3. Hydronic Systems: As follows:
 - a. Rating: Service at 125 psi WSP and 250°F.
 - b. Internal Construction: Replaceable plugs and seats of stainless steel or brass.
 - i. Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom of guided plugs.
 - ii. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom of guided plugs.
 - c. Sizing: 3-psi maximum pressure drop at design flow rate.
 - d. Flow Characteristics: 2-way valves have equal percentage characteristics; 3-way valves have linear characteristics. Select operators to close valves against pump shutoff head.
- C. Terminal Unit Control Valves: Bronze body, bronze trim, 2 or 3 port as indicated, replaceable plugs and seats, union and threaded ends.
 - 1. Rating: Service at 125 psi WSP and 250°F.

2. Sizing: 3-psi maximum pressure drop at design flow rate, to close against pump shutoff head.
3. Flow Characteristics: 2-way valves have equal percentage characteristics; 3-way valves have linear characteristics.
4. Operators (2 Position): Synchronous motor with enclosed gear train, dual-return springs, valve-position indicator. Valves spring return to normal position for temperature protection.
5. Operators (Modulating): Self-contained, linear motor, actuator with 60-second full travel, with transformer and single-throw, double-pole contacts.

2.22 DAMPERS

- A. Dampers: AMCA-rated, parallel or opposed blade design; form frames from not less than 0.1084-inch galvanized steel with mounting holes for duct mounting; damper blades not less than 0.0635-inch galvanized steel, with maximum blade width of 8 inches.
 1. Blades secured to 1/2-inch diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass. Ends sealed against spring-stainless-steel blade bearings. Thrust bearings at each end of every blade.
 2. Operating Temperature Range: From -40 to 200°F.
 3. For standard applications as indicated, (as selected by manufacturer's sizing techniques) with optional closed-cell neoprene edging.
 4. Provide low-leakage parallel or opposed blade design (as selected by manufacturer's sizing techniques) with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10 cfm/sq.ft. of damper area, at differential pressure of 4 inches wg when damper is being held by torque of 50 inch-pounds; test in accordance with AMCA 500. Ruskin CD-46 or equal.

2.23 ACTUATORS

- A. Electronic Actuators: The actuator shall be direct coupled over the shaft, enabling it to be mounted directly to the damper shaft without the need for connecting linkage. The actuator shall have electronic overload circuitry to prevent damage. For power-failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing. Non-spring return actuators shall have an external manual gear release to allow positioning of the damper when the actuator is not powered.
- B. All valves shall be fully proportioning, unless otherwise specified, quiet in operation, and shall be arranged to fail safe, in either a normally open or normally closed position, in the event of power failure. The open or closed position shall be as specified or as required to suit job conditions. All valves shall be capable of operating at varying rates of speed to correspond to the exact dictates of the controller and variable load requirements.

- C. Where valves operate in sequence with other valves or damper operators, provide on each valve a pilot positioner to provide adjustable operating ranges and starting points and positive close off at the required control signal pressure. Positioners must be directly connected to the valve stem. Ratio relays are not acceptable.
- D. Valves shall be sized by the Temperature Control Manufacturer and guaranteed to meet the heating or requirements as specified and indicated on the Drawings. Unless otherwise specified, all shall conform to the requirements herein specified for the piping system in which they are installed.

2.24 CENTRAL CONTROL PANEL

- A. Integrate new controls into existing central control touch screen panel. This central panel will allow for time clock scheduling, setpoints, monitoring of points and alarm. All freezestats will be reset manually at the central panel. All alarms will be displayed and reset manually at central panel.
- B. All exhaust fans shall be controlled by the central control panel.
- C. Central control panel shall be connected to existing District IT Network. District shall provide data drop.

2.25 AUXILIARY EQUIPMENT/DEVICES

A. Analog Sensors

1. Duct sensors (greater than four square feet): Monitoring range to suit application. Platinum or nickel wound RTD Type + 0.1% of range. Factory calibration point – 70 Deg. F at 1000 OHMS.
2. Space Temperature Sensors: Space Temperature Sensors shall be 5,000 or 10,000 ohm thermistor with wall plate adapter and blank cover assembly. The sensor shall include an integral occupancy override button and shall also include a RJ11 communications port. Space Temperature Sensors shall include space temperature adjustment slides where shown on the plans. The Space Temperature Sensors shall be mounted approximately 60" above the floor.
3. Hydronic Well Temperature Sensors: Water Temperature Sensors shall be well mounted 5,000 or 10,000 ohm thermistors.
4. Status Indication- Status indication for fans and pumps shall be provided by a current sensing sensor. The sensor shall be installed at the motor starter or motor to provide load indication. The unit shall consist of a current transformer, a solid state current sensing circuit (with adjustable set point) and a solid state switch. A red light emitting diode (LED) shall indicate the on off status of the unit. The switch shall provide a N.O. contact for wiring back to the Field Installed Controller.

5. Combination CO₂ and Space Temperature Sensors: CO₂ and space sensors are comprised of two sensors housed in one unit designed to measure both CO₂ in the air and the building air temperature. Combination sensor shall have the following features:
 - a. Self-Calibration CO₂ sensor with 5 year calibration interval.
 - b. Push button override.
 - c. CO₂ sensitivity +/- 20 ppm.
 - d. CO₂ accuracy +/- 100 ppm.
 - e. Space sensor: 5 or 10K thermistor.

2.26 DDC SENSORS AND POINT HARDWARE

A. Temperature Sensors

1. All temperature devices shall use precision thermistors accurate to +/- 1 degree F over a range of -30 to 230 degrees F. Space temperature sensors shall be accurate to +/- .5 degrees F over a range of 40 to 100 degrees F.
2. Standard space sensors shall be available in an off white enclosure for mounting on a standard electrical box.
3. Where manual overrides are required, the sensor housing shall feature both an optional sliding mechanism for adjusting the space temperature setpoint, as well as a push button for selecting after hours operation.
4. Where a local display is specified, the sensor shall incorporate either an LED or LCD display for viewing the space temperature, setpoint and other operator selectable parameters. Using built in buttons; operators shall be able to adjust setpoints directly from the sensor.
5. Duct temperature sensors shall incorporate a thermistor bead embedded at the tip of a stainless steel tube. Probe style duct sensors are useable in air handling applications where the coil or duct area is less than 14 square feet.
6. Averaging sensors shall be employed in ducts, which are larger than 14 square feet. The averaging sensor tube must contain at least one thermistor for every 3 feet, with a minimum tube length of 12 feet.
7. Immersion sensors shall be employed for measurement of temperature in all chilled and hot water applications as well as refrigerant applications. Thermal wells shall be brass or stainless steel for non-corrosive fluids below 250 degrees F. and 300 series stainless steel for all other applications.
8. A pneumatic signal shall not be allowed for sensing temperature.

B. Humidity Sensors

1. Humidity devices shall be accurate to +/- 5% at full scale for space and +/- 3% for duct and outside air applications. Suppliers shall be able to demonstrate that accuracy is NIST traceable.

2. Provide a hand held field calibration tool that both reads the output of the sensor and contains a reference sensor for ongoing calibration.

C. Pressure Sensors

1. Air pressure measurements in the range of 0 to 10" water column will be accurate to +/- 1% using a solid-state sensing element. Acceptable manufacturers include Modus Instruments and Mamac.
2. Differential pressure measurements of liquids or gases shall be accurate to +/- 0.5% of range. The housing shall be NEMA 4 rated.

D. Current and KW Sensors

1. Current status switches shall be used to monitor fans, pumps, motors and electrical loads. Current switches shall be available in solid and split core models and offer either a digital or an analog signal to the automation system. Acceptable manufacturer is Veris or approved equal.
2. Measurement of three-phase power shall be accomplished with a kW/kWH transducer. This device shall utilize direct current transformer inputs to calculate the instantaneous value (kW) and a pulsed output proportional to the energy usage (kWH). Provide Veris Model 6000 Power Transducer or approved equal.

E. Flow Sensors

1. Provide an insertion vortex flow meter for measurement of liquid or gas flows in pipe sizes above 3 inches.
2. Install the flow meter on an isolation valve to permit removal without process shutdown.
3. Sensors shall be manufactured by EMCO or approved equal.

F. Carbon Dioxide Sensors

1. Non-Dispersive Infrared (NDIR), 0-2000 PPM.
2. Power Requirement, 18-30 VDC.
3. Voltage output, 0-10- VDC Full Scale.
4. Current output, 4-20 mA

2.27 AIRFLOW MEASURING STATIONS

- A. Provide a thermal anemometer using instrument grade self-heated thermistor sensors with thermistor temperature sensors. The flow station shall operate over a range of 0 to 5,000 feet/min with an accuracy of +/- 2% over 500 feet/min and +/- 10 ft/min for reading less than 500 feet/min.
- B. The output signal shall be linear with field selectable ranges including 0-5 VDC, 0-10VDC and 4-20 mA.
- C. Furnish Ebtron Series 3000 airflow stations or approved equal.

3.7 SEQUENCES OF OPERATION

A. VRF Heat Recovery System

1. Point List

- a. Space Temperature
- b. Occupied/Unoccupied
- c. VRF Space Temperature Setpoint
- d. VRF Indoor Mode (Heating/Cooling)
- e. VRF Indoor Unit fan speed
- f. Duct Mounted Electric Coil Modulation (as applicable)
- g. DOAS/Energy Recovery Unit Status (as applicable)
- h. Baseboard Fin Tube/Cabinet Heater/Convactor Control Valve Status (as applicable)
- i. VRF Outdoor Mode/status
- j. OA Damper open/close
- k. Exhaust fan start/stop/status

(Provide all required hardware and software to interface the BMS with the VRF system.)

2. Sequence of Operation

- a. Unoccupied Mode: OA Damper shall close. Exhaust fan shall de-energize. Cooling shall not operate. Baseboard radiation/cabinet heater/convactor (if applicable) shall operate as Stage 1 heating. Room VRF heat recovery heating shall operate as stage 2 as required to satisfy space temperature setback setpoint.
- b. Occupied Mode: OA Damper shall open. Exhaust fan shall energize. Heating or cooling shall operate as required based upon its own packaged controls integrated with 3rd party thermostat to maintain thermostat setpoint. Baseboard radiation/cabinet/heater/convactor shall operate as Stage 1 heating. Room VRF heat recovery heating shall operate as Stage 2 as required to maintain space thermostat setpoint. Heat recovery mode shall operate, providing heating or cooling as required. Unoccupied/Occupied scheduling will be via BMS. VRF supply fan shall stop when space set point is satisfied. Electric duct coil shall modulate to maintain minimum OAI temp at 50°F. (Adjustable)
- c. Alarms shall be generated at Operator's Workstation.

B. Fin-Tube Radiation

1. Point List

- a. Space Temperature
- b. Valve Modulation

2. Sequence of Operation
 - a. Unoccupied Mode (Heating Season): Modulate control valve to maintain night setback temperature set-point (adjustable).
 - b. Occupied Mode (Heating Season): Modulate control valve to maintain daytime temperature set-point (adjustable). Interface with second stage heating.
 - c. Alarms: In this mode: Should space temp fall out of range by 5° F (high/low) an alarm will be generated at the operator's workstation.

(Provide all required hardware and software to interface the baseboard with the VRF system through the BMS.)

C. Exhaust Fans (Toilets)

1. Point List
 - a. Fan Start/Stop
 - b. Fan Status
2. Sequence of Operation
 - a. Unoccupied Mode: Fans Off, Dampers Closed.
 - b. Occupied Mode: Fans On, Dampers Open.
 - c. Alarms generated at operator's workstation: Exhaust Fan Status.

D. Roof Mounted Energy Recovery Ventilation Units

1. Point List
 - a. Supply Fan Status
 - b. Exhaust Fan Status
 - c. OA, EA, Air Temperatures
 - d. OA, EA, Damper
 - e. Discharge Air Temperature
 - f. Heating Coil Modulation
 - g. VRF D/X Heating/Cooling Coil Status
 - h. Respective VRF Outdoor Unit Status
 - i. Energy Recovery Wheel VFD Speed Status
 - j. Dirty Filter Status
 - k. Freeze Stat
 - l. Radiation Modulation
 - m. Duct mounted electric heater on/off duct temperature sensors before & after heater with adjustable set point (in supply duct +/- 60°F, in outdoor air duct +/- 20 °F).
2. Sequence of Operation
 - a. Unoccupied - In this mode:
Supply and Exhaust fans off, OA and EA dampers closed, perimeter baseboard heat (if applicable) shall be Stage 1. If additional heat is required, the respective VRF unit(s) (if applicable) shall start and run as

stage 2 to maintain the night setback temperature (60°F). The respective outdoor VRF unit shall operate as required for all systems.

b. Occupied - In this mode:

- i. The OA and EA dampers will open and thru a hard wired interlock the Supply and Exhaust fans will start.
- ii. Energy transfer will be both sensible and latent energy between air streams. Latent energy transfer media transfer will be accomplished by direct water vapor transfer from one air stream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air.
- iii. The heating coil shall operate as required to maintain occupied heating discharge setpoint (72°F adjustable) as sensed by the duct discharge temperature sensor. If additional heat is required, the respective VRF unit shall operate as required to maintain the occupied heating discharge set point.
- iv. The respective outdoor VRF unit shall operate as required to maintain occupied heating or cooling discharge setpoint (72°F adjustable) as sensed by the duct discharge temperature sensor. Perimeter baseboard heat (if applicable) shall be Stage 1. If additional heat is required, the respective VRF unit(s) (if applicable) shall start and run as stage 2.
- v. An adjustable dead band offset will prevent short cycling.
- vi. If discharge air temperature fails to maintain setpoint, electric duct heater shall be energized. Duct heater shall be de-energized when supply air temperature reaches 20°F higher than room set point (adjustable).

c. Alarms: In this mode:

- i. Should the command not equal the status within 90 seconds from start-up an alarm will be generated at the operator's workstation.
- ii. Should any temperature fall outside of its preset limits (high/low) an alarm will be generated at the operator's workstation.

d. Economizer - In this mode:

- i. An enthalpy calculation shall be used to determine if the system shall run in this mode. Unit shall operate according to its own packaged controls to control the wheel operation and speed when outdoor conditions are favorable.
- ii. When in this mode, the heat transfer wheel shall stop, mechanical cooling shall stop, and the economizer system shall be enabled. The ERU heat transfer wheel rotation shall stop in economizer mode.

E. Packaged Rooftop Units

1. Point List

- a. Supply Fan VFD (Speed and Status)
- b. Exhaust Fan VFD (Speed and Status).
- c. Energy Recovery Wheel VFD (Speed and Status)
- d. Space Temperature
- e. Space Temperature Setpoint(s)
- f. OA, EA, RA and Mixed Air Temperatures
- g. Heating Coil Modulation
- h. OA, EA, RA Damper Modulation
- i. Freeze-stat
- j. Discharge Temperature
- k. DX Cooling Start/Stop/Status
- l. Perimeter Radiation (As applicable)
- m. Heat Recovery Wheel Status

2. Sequence of Operation

- a. Unoccupied: In this mode:
Supply and Exhaust fans off, OA and EA dampers closed. Upon a call for heat, the perimeter heat shall operate to satisfy the temperature setpoint. If required, the supply fan and DX heating cycles on to maintain 55°F space temperature (adjustable).
- b. Morning Warm-up: During the heating season, a warm-up mode will be invoked if the return air temperature is below 60°F (adj.) upon unit start-up. In this mode:
 - i. The OA and EA dampers will open and thru a hard wired interlock the supply and exhaust fans will start. Fans will slowly ramp up to preset speed. The warm-up program will reset the DX heating coil supply air temperature setpoint to 80°F (adj.). The DX heating coil will modulate to maintain the supply air temperature setpoint. The supply air setpoint will be reset linearly and inversely from 80°F (adj.) to 70°F (adj.) as the return air temperature increases from 60°F to 70°F (adj.). If the DX coil is unable to provide the required heat, the electric coil shall modulate on.
 - ii. Once the return air has reached 70°F (adj.) the RTU will be controlled as described in the occupied mode.
 - iii. Note: the energy recovery wheel will be on when the unit is on and rotate as needed to maintain exhaust air temperature. Energy wheel freeze protection is integral to the unit.
 - iv. Perimeter Radiation – will be the first stage of heating and will open to bring room up to occupied setpoint (adjustable). The RTU will work in sequence to maintain the heating space temperature setpoint.

- c. Cool Down: During the cooling season, a cool-down mode will be invoked if the return air temperature is above 80°F (adj.) upon unit start-up. In this mode:
- i. The cool-down program will reset the supply air temperature setpoint to 55°F (adj.)
 - ii. The OA and EA dampers will open, OA and EA bypass dampers will be closed, RA damper open,
 - iii. The direct expansion cooling system shall operate to maintain the supply air temperature setpoint. The supply air setpoint will be reset linearly and inversely from 55°F (adj.) to 70°F (adj.) as the return air temperature decreases from 80°F to 70°F (adj.).
 - iv. Once the return air has reached 70°F (adj.) the ERU will be controlled as described in the occupied mode.
 - v. Note: the energy recovery wheel will be on when the unit is on and rotate as needed to maintain exhaust air temperature. Energy wheel freeze protection is integral to the unit.
 - vi. Perimeter Radiation – will be closed.
- d. De-Humidification: During the cooling and shoulder seasons, if space temperature is satisfied and return duct humidity sensor senses humidity out of bounds, hot gas reheat de-humidification mode shall be energized.
- e. Occupied: In this mode:
- The OA and EA dampers will open, OA and EA bypass dampers will be closed, RA damper closed;
- i. Supply fan will start and ramp up slowly to its' preset speed via VFD. The return fan will follow and track the supply fan as needed.
 - ii. Perimeter radiation valves will be the first stage of heating and open as needed to maintain the space temperature setpoint (adj.). Should additional heating be required the RTU will modulate the DX heating coil to maintain the heating setpoint (adjustable).
 - iii. Direct expansion cooling system shall operate as needed to maintain occupied cooling setpoint (adjustable).
 - iv. Electric heating coil in sequence with the DX coil. will modulate as needed to maintain occupied heating setpoint (adjustable).
 - v. An adjustable dead band offset will prevent short cycling.
 - vi. Note: the energy recovery wheel will be on when the unit is on and rotate as needed to maintain exhaust air temperature (by others). Energy wheel freeze protection is integral to the unit.
- f. Economizer Mode: In this mode:
- i. An enthalpy calculation shall be used to determine if the system shall run in this mode. Unit shall operate according to its own packaged controls to control the wheel operation and speed when outdoor conditions are favorable.
 - ii. When in this mode, the heat transfer wheel shall stop, mechanical cooling shall stop, and the economizer system shall be enabled.

The ERU heat transfer wheel rotation shall stop in economizer mode.

- iii. This will be the first stage of cooling should additional cooling be required the mechanical cooling shall operate as needed.
 - iv. Note: the energy recovery wheel will be off during economizer mode. Energy wheel freeze protection is integral to the unit.
- g. Alarms: In this mode:
- i. Should the command not equal the status within 90 seconds from start-up an alarm will be generated at the operator's work station.
 - ii. Should any temperature fall outside of its preset limits (high/low) an alarm will be generated at the operator's work station.
- h. Heat Recovery:
- i. The heat recovery wheel shall operate whenever the unit is operating in the Occupied mode, according to its own packaged controls.

3.8 CONTROL DIAGRAMS

- A. Complete new control diagrams showing type of apparatus, cycles of operation and details of all equipment must be submitted for checking and be approved before installation is started.
- B. Submit three (3) preliminary copies of the control diagrams, sequence descriptions, and equipment shop drawings for checking and submit six (6) copies, complete for final approval.
- C. At the completion of installation, control manufacturer shall furnish non-fading original; plastic laminated copies of all control diagrams as they apply to the particular instruments thereon. One complete set of non-fading plastic laminated diagrams shall be mounted on wall as directed.

3.9 CERTIFICATION

- A. After completion of installation and after equipment has been placed on operation, the temperature control manufacturer shall submit in writing, a complete and detailed report and certification that the entire installation is operating exactly as specified and shall be guaranteed for one year. Report shall state temperature and throttling range readings and settings of all control instruments. Submit to the Engineer preliminary for checking and approval.

3.10 INSTALLATION

- A. All work under the automatic temperature control Sub-Contract shall be done by competent skilled mechanics regularly in the employ of the temperature control manufacturer.

- B. Bidder must be a control manufacturer currently involved in the production of commercial pneumatic/electric temperature controls. Franchises and associations are not considered control manufacturers.

3.11 TRAINING

- A. Provide start-up supervision, complete with all programming and instructions for use to the Owners/operators of the system.

- B. Instructions to Owner's Staff

- 1. The Contractor shall include in his bid price the cost of providing appropriate training in the operation, adjustment and maintenance, including safety requirements, of the specified Automatic Temperature Control System (ATCS) as outlined below. Training shall be provided by knowledgeable instructors and shall be tailored towards the specific needs and installed system of the site. It shall not be a generic (canned) course. All instructors shall be thoroughly familiar with all aspects of the subject matter to be taught. All equipment and material required for classroom training, including printed matter, shall be provided by the Contractor.

- C. Training Program

- 1. The training program shall be accomplished in three (3) phases for the time interval specified for each phase. A training day is defined as eight (8) hours of instruction including two 15-minute breaks and excluding lunchtime.
 - 2. Training room should be clean, well-lit, well-ventilated and isolated from noise and other distractions (including HVAC noise). Ideally, the lights should be controllable to permit adequate contrast on any projection screen yet provide students with enough lighting to take notes.
 - 3. Instructor should use a LCD screen or other device to project large images of software or other training images. Students should have their own computers on which to work; no computer should be used by more than two students.
 - 4. Printed training materials should be tailored to the task at hand and should be well illustrated. Materials should take students through the steps of learning the ATCS and its software and should provide sample exercises students to perform on their classroom computers. All printed materials shall be presented to Owner for prior review and approval at least two weeks before the training begins. A full set of printed materials shall be made available for each student, plus two extra sets for the Owner.
 - 5. If the ATCS or its software requires knowledge about HVAC, the use of a computer (or a mouse, Windows, etc.) or other technical information, these requirements should be spelled out to the Owner far enough in advance for students to take pre-training in these areas.

6. Training should steer clear of jargon and other confusing terminology and focus instead on learning how to use the system. Specific jargon can be addressed after the students have gained reasonable facility with the system.
7. All ATCS training should include a “hands-on” component that permits the students to see the hardware in place and watch the software in action.
8. Training should include quizzes and test that compel students to demonstrate understanding of the training’s most important concepts. Students who “fail” these tests should be assisted, by the instructor and other students, in trying again until they achieve a basic level of understanding.
9. Training should involve actual equipment using a training demonstration package that simulates real-time temperatures, settings and alarms.
10. The overall training approach should be interactive, encouraging students to discuss concepts and issues and share experiences.
11. Phase I
 - a. This phase will be for a period of two (2) days prior to the acceptance test period at a time mutually agreeable the Contractor and the Owner. Operating personnel will be trained in the basic functions of the installed system, the procedures for system operation and the maintenance of ATCS hardware.
 - b. The first day shall include:
 - i. Overall structure of the system.
 - ii. Logging on and off the system.
 - iii. Developing point legs.
 - iv. Executing commands.
 - v. Generating reports.
 - vi. Using trending capabilities.
 - vii. Using alarm capabilities.
 - viii. Working with graphics.
 - ix. Hardware function and identification.
 - x. Input function and identification.
 - c. The second day of training shall include:
 - i. Review of first day.
 - ii. Hardware access and software manipulation.
 - iii. ATCS troubleshooting.
 - iv. ATCS preventative maintenance.
 - v. Sensor maintenance and calibration.

12. Phase II

- a. This phase of training shall be conducted approximately four (4) weeks after system acceptance testing for a period of two (2) days. The first day of training will be condensed review of the entire first phase subject material. The second day will be based upon subject matter proposed by Owner personnel. One week prior to the date of the first Phase II training session, the Owner shall submit to the Contractor a detailed list of subject matter, which shall determine the content of the program (e.g. system software operational problems, software utilization, capability and usage, etc.).

13. Phase III

- a. Provide a third phase of training after the completion of one heating and cooling season. The particulars of this phase of training will be similar to that of Phase II.
- b. Three (3) neatly bound vinyl notebooks shall be provided by the Contractor containing a summary of each topic discussed during the three phase of training. Each training session shall be video taped by a professional videographic representative.

14. A factory representative shall witness the final system test and then certify with an affidavit that the system is installed in accordance with the Contract Documents and is operating properly.

END OF SECTION 230460

SECTION 230470 - TESTING, START-UP AND ADJUSTMENTS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 TESTING, START-UP AND ADJUSTMENTS

- A. Furnish all materials, supplies, labor and power required for testing. Make preliminary tests and prove work satisfactory. Notify Architect and all authorities having jurisdiction in ample time to be present for final testing of all piping. Test before insulating or concealing any piping. Repair defects disclosed by tests, or if required by Architect, replace defective work with new work without additional cost to Owner. Make tests in stages if so ordered by Architect to facilitate work of others. Use of wicking in tightening leaking joints not permitted.
- B. HVAC Contractor is responsible for work of other trades disturbed or damaged by tests and/or repair and replacement of his work, and shall cause work so disturbed or damaged to be restored to its original condition at his own expense.
- C. Unless otherwise specified, all piping systems shall be hydrostatically tested to 150 p.s.i.g. Tests shall be of four (4) hour duration during which time piping shall show no leaks and during time no sealing of leaks will be permitted.
- D. HVAC Contractor shall balance out system and submit test reports showing operating data to include the following:
 - 1. C.F.M. of all air handling equipment.
 - 2. C.F.M. at each air outlet.
 - 3. G.P.M. for equipment.
 - 4. R.P.M. for each fan and fan motor.
 - 5. Motor power consumption.
 - 6. Air temperature readings before and after coils.
 - 7. Water temperature readings in and out of coils and through equipment.
 - 8. Pressure gauge readings before and out of all pertinent equipment.
- E. If the performance of the systems does not conform to the design parameters the Contractor shall return to the site until the systems perform as designed.
- F. HVAC Contractor shall furnish services of qualified personnel, thoroughly familiar with job, to operate and make all adjustments so that system and control equipment shall operate as intended. This shall include adjustment/replacement of sheaves/impellers to achieve design performance. Adjustments shall be made including balancing of water and air systems in cooperation with qualified representatives of mechanical equipment manufacturers and temperature control manufacturer. This shall include any required adjustment/replacement of sheaves, belts, impellers, etc. to achieve design performance. Architect/Engineer is to be notified when this balancing is to be performed.

- G. When all work is in an acceptable operating condition, furnish operating and maintenance manuals as specified in General Requirements.
- H. All HVAC equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces.
- I. Contractor shall include in his Bid, adjustment of air quantity below scheduled C.F.M. for air systems deemed "noisy" by Owner subsequent to initial balancing.
- J. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.
- K. Final inspection and approval shall be made only after proper completion of all of above requirements.

END OF SECTION 230470

SECTION 230480 - GENERAL LABELING, VALVE CHARTS AND PIPING IDENTIFICATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 GENERAL LABELING AND VALVE CHARTS

- A. This Contractor shall have appropriate descriptive labels, identification tags and nameplates of equipment, valves, etc. furnished and installed under this Contract and shall be properly placed and permanently secured to (or adjacent to) the item being installed. All such labels, identifications, tags, nameplates, etc. shall be selected by the Architect/Engineer.
- B. In general, labels shall be the lamacoid type of sufficient size to permit easy identification, black coated, white edged, with letters 3/16" high. Major equipment, apparatus, control panels, etc. shall have 8" x 4" lamacoid plates with lettering of appropriate size.
- C. Provide tags for all valves, automatic and manual dampers. Tags shall be Type #2020 anodized aluminum of #1420 lamacoid engraved. Tags may not necessarily be standard. Fasten tags to valve or damper with brass chain.
- D. All nameplates, labels, identifications and tags shall be as manufactured by the Seton Name Plate Co., of New Haven, CT or approved equal. Submit complete schedules, listings and descriptive data together with samples for checking and approval before purchasing. Labeling shall include the "number" of the equipment, valve, dampers, switch, etc. and service of the valve.
- E. Mount on laminated plastic boards with transparent surface all valves, wiring diagrams, control diagrams, instruction charts, permits, etc. Valve chart shall be non-fading with original copies laminated.

1.2 IDENTIFICATION OF PIPING

- A. This Contractor shall provide on all piping, semi-rigid, wrap around plastic identification markers equal to Seton Snap-Around and/or Seton Strap-On pipe markers.
- B. Each marker background is to be appropriately color coded with a clearly printed legend to identify the contents of the pipe. Directions of flow arrows are to be included on each marker.
- C. Identification of all piping shall be adjacent to each valve, at each pipe passage through wall, floor and ceiling construction and at each branch and riser take-off.
- D. Identification shall be on all horizontal pipe runs, marked every 15 ft. as well as at each inlet outlet of equipment.

END OF SECTION 230480

SECTION 230485 - HVAC SYSTEMS COMMISSIONING

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 RELATED DOCUMENTS

- A. Section 01 9100 – Commissioning Requirements, including drawings and general provisions of the Contract, including General and Supplementary Conditions, and other Division 01 Specification Sections.
- B. In the case of a conflict between this and any other section in the project specifications, the more stringent or detailed requirements shall apply.

1.2 DEFINITIONS

- A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. CxA: Commissioning Authority.

1.3 DESCRIPTION

- A. The systems that shall be commissioned in this project include but are not limited to the following:
 - 1. Central Building Automation System including packaged unitary controllers.
 - 2. Equipment of the heating, ventilating and air conditioning systems.

1.4 OVERVIEW OF CONTRACTOR'S RESPONSIBILITIES

- A. Perform commissioning inspections and tests at the direction of the CxA.
- B. Attend construction phase controls coordination meeting.
- C. Attend testing, adjusting, and balancing (TAB) review and coordination meetings.
- D. Participate in HVAC systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
- E. Provide information requested by the CxA for final commissioning documentation.
- F. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for the complete range of testing for the required test period.

- G. Provide detailed startup procedures.
- H. Provide copies of all submittals, including all changes thereto, with details as required in the appropriate subsection of 3.1 Responsibilities.
- I. Facilitate the coordination of the commissioning process and incorporate commissioning activities into overall project schedule (OPS).
- J. Ensure all subcontractors and vendors execute their commissioning responsibilities according to the contract documents and the OPS.
- K. Provide required demonstration and training of owner's personnel.
- L. Review and accept construction checklists provided by commissioning authority (CxA).
- M. Prepare O&M manuals, according to the contract documents, including clarifying and updating the original sequences of operation to as-built/as-tested conditions.
- N. Cooperate with the CxA for resolution of issues recorded in the "Issues Log"
- O. Prepare and provide all documentation as necessary for the compilation of the Systems Manual.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. The HVAC Contractor shall provide all standard testing equipment required to perform startup, initial checkout, and testing requirements of Division 23.
- B. The Controls Contractor shall provide all standard testing equipment required to test the Building Automation and Automatic Temperature Control System (BAS), including calibration of valve and damper actuators and all sensors. Trend logs for functional testing shall be generated through the BAS interface as requested by the CxA.
- C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the following tolerances. Temperature sensors and digital thermometers shall have a certified calibration, performed within the past year, to an accuracy of 0.5°F and a resolution of ± 0.1 °F. Pressure sensors shall have an accuracy of $\pm 2.0\%$ of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 RESPONSIBILITIES

- A. HVAC, Controls and TAB Contractors. The commissioning responsibilities applicable to each of the HVAC, Controls and TAB Contractors of Division 23 are follows:

1. Attend the initial commissioning meeting conducted at the start of construction, the commissioning meeting held 30 days prior to startup of the primary equipment, and all commissioning team meetings.
2. Provide a copy of approved shop drawings and startup reports for all commissioned equipment to the CxA. Supplement the shop drawing data with the manufacturer's installation and start-up procedures. This material should be identical to the literature which will be included in the Operation and Maintenance Manuals.
3. The Operation and Maintenance Manuals shall be submitted to the CM prior to the start of training (three (3) weeks before startup and training and at least sixty (60) days before substantial completion).
4. Perform and document results of Pre-functional Inspections at the direction of the CxA. Ensure that the inspection checklists are completed before startup or as specified by the CxA.
5. During the startup and initial checkout process, execute all portions of the manufacturer's start-up checklists for all commissioned HVAC equipment.
6. Perform and clearly document all completed startup and system operational checkout procedures and provide a copy to the CxA.
7. Perform and document results of equipment functional testing at the direction of the CxA. Ensure that the testing is completed in the timeline specified by the CxA.
8. Address current A/E punch list items and Commissioning corrective action items on the "Issues Log" before functional testing. Air and water TAB shall be completed, with discrepancies and problems remedied, before functional testing of the respective air-or water-related systems.
9. Provide skilled technicians to execute starting of equipment and to perform tests in accordance with all Division 23 sections. Where specified, startup shall be performed by a factory authorized service representative. Ensure that they are available and present during the agreed-upon schedules for the sufficient duration to complete the necessary tests, adjustments and problem-solving.
10. Correct deficiencies (differences between specified and observed performance as interpreted by the CxA and A/E) and retest the equipment.
11. Provide training of Owner's operating staff as specified in Division 23 Sections. Use expert qualified personnel.
12. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.
13. Correct deficiencies and make necessary adjustments to O&M manuals for applicable issues identified in any seasonal testing.

- B. HVAC Contractor. The responsibilities of the HVAC Contractor, during construction and acceptance phases in addition to those listed in (A) are:
1. Provide startup for all HVAC equipment.
 2. Prepare a preliminary schedule for Division 23 pipe and duct system testing, flushing and cleaning, equipment start-up and TAB start and completion for use by the PM and CxA. Update the schedule as appropriate.
 3. Notify the PM and CxA when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment, and TAB will occur. Be proactive in seeing that commissioning processes are executed and that the CxA has the scheduling information needed to efficiently facilitate the commission process.
 4. Calibrations: The HVAC Contractor is responsible to calibrate all factory-installed sensors and actuators. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated by the HVAC Contractor.
 5. Supervise all commissioning activities executed by subcontractors, including the Controls Contractor.
 6. List and clearly identify on the as-built duct and piping drawings the locations of all flow meters, fire and smoke dampers, duct detectors, temperature sensors, relative humidity sensors, CO2 sensors, static and differential pressure sensors (air, water and building pressure).
- C. Controls Contractor - The commissioning responsibilities of the Controls Contractor, during construction and acceptance phases in addition to those listed in (A) are:
1. Sequences of Operation Submittals. The Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. The submitted sequences shall generally include the following, but can vary according to project needs:
 - a. An overview narrative of the system (one or two paragraphs) generally describing its purpose, components and function.
 - b. Logic diagrams detailing the flow of information for each control algorithm. These diagrams should include all inputs, outputs, and computations.
 - c. All interactions and interlocks with other systems.
 - d. Detailed delineation of control between any packaged controls and the building automation system, listing which points are only monitored at the BAS, and which points can be controlled by and adjusted at the BAS.
 - e. Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included but will generally require additional narrative).
 - f. Start-up sequences.
 - g. Warm-up mode sequences.
 - h. Normal operating mode sequences.
 - i. Unoccupied mode sequences.

- j. Shutdown sequences.
- k. Capacity control sequences and equipment staging.
- l. Temperature and pressure control: setbacks, setups, resets, etc.
- m. Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
- n. Effects of power or equipment failure with all standby component functions.
- o. Sequences for all alarms and emergency shut downs.
- p. Seasonal operational differences and recommendations.
- q. Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
- r. Daily/weekly/monthly schedules, as appropriate, if known.
- s. To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. Where possible, the numbering sequence shall correspond with Section 23 0460 Automatic Temperature Controls.

2. Control Drawings Submittal:

- a. The control drawings shall have a key to all abbreviations.
- b. The control drawings shall contain graphic schematic depictions of the system and each component.
- c. The schematics shall include the system and component layout of any equipment that the control system monitors, enables, or controls, even if the equipment is primarily controlled by packaged or integral controls.
- d. Provide a full points list with at least the following included for each point:
 - 1. Controlled system.
 - 2. Point abbreviation
 - 3. Point description
 - 4. Display unit.
 - 5. Control point or setpoint (Yes/No)
 - 6. Input point (Yes/No)
 - 7. Output point (Yes/No)
- e. The controls contractor shall keep the A/E, CxA, HVAC and TAB Contractor informed, in a timely manner, of all changes to this list during programming and setup.

3. Submit a written checkout plan indicating in a step-by-step manner, the procedures that will be followed to test, checkout and adjust the control system prior to functional testing. At minimum, the checkout plan shall include for each type of equipment controlled by the building automation system:

- a. System name.
- b. List of devices.

- c. Step-by-step procedures for testing each controller after installation, including:
 1. Process of verifying proper hardware and wiring installation.
 2. Process of downloading programs to local controllers and verifying that they are addressed correctly.
 3. Process for performing and documenting point-to-point checkout for each digital and analog input and output.
 4. Process of performing operational checks of each controlled component.
 5. Plan and process for calibrating valve and damper actuators and all sensors.
 6. A description of the expected field adjustments for transmitter, controllers and control actuators should control responses fall outside of expected values.
 - d. A copy of the log and field checkout sheets that will document the process. This log must include a place for initial and final read values during calibration of each point and clearly indicate when a sensor, controller or command has "passed" and is operating within the contract parameters.
 - e. A description of the instrumentation required for testing.
 - f. Indicate the portion of the controls checkout plan that should be completed prior to TAB using the controls system for TAB work. Coordinate with the CxA and TAB Contractor for this determination.
4. Point-to-Point Checkout: Include in the checkout plan a point-to-point checkout. Each control point tied to a central control system shall be verified to be commanding, reporting and controlling according to its intended purpose. For each output, commands shall be initiated and verified to be functioning by visually observing and documenting the status of the controlled device in the field (e.g. valve or damper actuator response, pump or fan status). For each input, the system or conditions shall be altered to initiate the input response being tested and the response in the control system observed and recorded (e.g. high duct static pressure alarm).
 5. Calibrations: The Controls Contractor is responsible to calibrate all field installed sensors and actuators using test and documentation methods approved by the CxA. The HVAC Contractor is responsible to calibrate all factory installed sensors and actuators.
 - a. Sensors installed in the unit at the factory, with a calibration certification provided, need not be field calibrated by the HVAC Contractor.
 - b. Valve leak-by tests shall be conducted by the Contractor when shown on a construction checklist.
 - c. All procedures used shall be fully documented by the Controls Contractor on suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.

6. Beyond the control points necessary to execute all documented control sequences, provide monitoring, control and virtual points as indicated in the Specifications.
7. Provide an official notice to proceed to the CxA and project team upon completion of the Building Automation System (BAS) and Automatic Temperature Control System (ATC) installation, including checkout and calibration of each controlled device, to confirm that all system programming is complete as to all respects of the Contract Documents. This shall be submitted by the Controls Contractor prior to the start of functional testing by the CxA.

D. TAB Contractor: The scope of work for the TAB Contractor is provided in Section 230460.

3.2 SUBMITTALS

- A. The Contractor shall send one copy of product data, shop drawings and similar submittals to the CxA at the same time they are submitted to the A/E. The CxA will review the submittals and provide any comments to the A/E for inclusion in their comments. The Architect will transmit to the CxA, for the CxA's use in preparing functional test procedures; one reviewed and approved copy of product data, shop drawings and similar submittals received from the HVAC, Controls and TAB Contractors, pertinent to equipment and systems to be commissioned.

3.3 STARTUP

- A. The HVAC, Controls and TAB Contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section. Equipment start-up is required to complete systems and sub-systems so they are fully functional, in compliance with the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility, or partially shift that responsibility to any extent onto the Commissioning Agent or Owner.
- B. Testing is intended to begin upon completion of a system. Refer to Section 019100 for additional information related to scheduling.

3.4 TESTS

- A. The HVAC and Controls Contractors shall provide the necessary support to the CxA to complete functional testing. The Controls Contractor shall fully test and verify all aspects of the BAS Contract Work on a point / system / integrated operational basis for all points, features and functions specified. The following requirements apply to all mechanical and control systems and features that are to be commissioned when referenced below. Tests shall:
 1. Verify functionality and compliance with the basis of design for each individual sequence module in the sequence of operations. Verify proper operation of all control strategies, energy efficiency and self-diagnostics features by stepping through each sequence and documenting equipment and system performance. Tests shall include startup, normal operation, shutdown, scheduled 'on' and 'off', unoccupied and manual modes, safeties, alarms, over-rides, lockouts and power failure.

2. Verify operation of systems and components that may be impacted during low, normal and high load conditions and during combinations of environmental and interacting equipment conditions that could reasonably exist and potentially result in adverse system reaction.
 3. Verify all alarm and high and low limit functions and messages generated on all points with alarm settings.
 4. Verify integrated performance of all components and control system components, including all interlocks and interactions with other equipment and systems.
 5. Verify shutdown and restart capabilities for both scheduled and unscheduled events (e.g. power failure recovery and normal scheduled start/stop).
 6. Verify proper sequencing of heat transfer elements as required to prevent simultaneous heating and cooling, unless specifically required for dehumidification operation.
 7. Verify system response and stability of control loops under different load conditions and determine if additional loop tuning is required for dehumidification operation.
 8. When applicable, demonstrate a full cycle from 'off' to 'on' and 'no load' to 'full load' and then to 'no load' and 'off'.
 9. Verify time of day schedules and setpoints.
 10. Verify all energy saving control strategies.
 11. Verify that all control system graphics are complete, that graphics are representative of the systems, and that all points and control elements are shown in the same location on the graphics as they are located in the field.
 12. Verify operation control of all adjustable system control points, including proper access level as agreed to during the controls system demonstration.
- B. In addition to specific details, and/or standards referenced for acceptance testing indicated in other Division 23 sections, the following common acceptance criteria shall apply to all mechanical equipment, assemblies, and features:
1. For the conditions, sequences and modes tested, the equipment, integral components and related equipment shall respond to varying loads and changing conditions and parameters appropriately as expected, according to the sequence of operation, as specified, according to acceptable operating practice and the manufacturer's performance specifications.
 2. Systems shall accomplish their intended function and performance (e.g. provide supply air and water at designated temperature and flow rate, etc., and maintain space conditions in terms of air temperature, relative humidity, and CO2 concentration) at specified levels at varying conditions.

3. Control loops shall be stable under all operating conditions. Control loops shall exhibit a quarter decay ratio type response to a step change or other upset and return to stable operation in a time frame that is reasonable and realistic for the system that they are associated with.
4. Resetting a manual safety shall result in a stable, safe, and predictable return to normal operation by the system.
5. Safety circuits and permissive control circuits shall function in all possible combinations of selector switch positions (hand, auto, inverter, bypass etc.).
6. Additional acceptance criteria may be defined by the CxA when detailed tested procedures are developed.
7. At the CxA's discretion, if large numbers of deficiencies or repeated deficiencies are encountered, the CxA shall suspend functional testing until the Contractor corrects the deficiencies and troubleshoots all remaining systems at issue on their own. The Contractor shall be responsible for any resulting schedule delays that increase the overall time period to complete functional testing.
8. Retesting: The CxA will direct the retesting of the equipment once at no charge to the Owner for their time. The CxA's time and expenses incurred for a second retest, if required due to no fault of the CxA, will be reviewed by the Owner to determine the appropriate means of compensation to the CxA for extension of services. The functional testing shall include operating the system and components through each of the written sequences of operation, and other significant modes and sequences, including startup, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during construction checkout by the installing contractors and spot-checked by the CxA during functional testing.

3.5 WRITTEN WORK PRODUCTS

- A. Written work products of Contractors shall consist of the filled out start-up, initial checkout, and test documentation in accordance with all Division 23 sections.

END OF SECTION 230485

SECTION 230490 - GUARANTEE

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 GUARANTEE

- A. The Contractor shall remove, replace and/or repair at his own expense and at the convenience of the Owner, any defects in workmanship, materials, ratings, capacities and/or characteristics occurring in the work within one (1) year or within such longer period as may be provided in the Drawings and/or Section of the Specifications, which guarantee period shall commence with the final acceptance of the entire Contract in accordance with the guarantee provisions stated in the General Conditions, and the Contractor shall pay for all damage to the system resulting from defects in the work and all expenses necessary to remove, replace, and/or repair any other work which may be damaged in removing, replacing and/or repairing the work.

END OF SECTION 230490

SECTION 260100 - GENERAL CONDITIONS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 DESCRIPTION OF WORK

- A. It is the intention of the Specification and Drawings to call for finish work, tested and ready for operation.
- B. Any apparatus, appliance material or work not shown on the Drawings but mentioned in the Specifications, or vice versa, or any incidental accessories or ancillary devices necessary to make ready for operation even if not particularly specified, shall be furnished, delivered and installed under their respective Division without additional expense to the Owner.
- C. Minor details not usually shown or specified, but necessary for proper installation and operation, shall be included in the work as though they were hereinafter specified or shown.
- D. Work under each section shall include giving written notice to the Architect of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules and regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each section has included the cost of all necessary items for the approved satisfactory functioning of the entire system without extra compensation.
- E. Small scale drilling through walls and floors which may contain asbestos shall be performed by a person with a "restricted asbestos handler allied trades certificate" and shall have a copy of it in his possession at all times while working of the project.

1.2 DRAWINGS

- A. Drawings are diagrammatic and indicate the general arrangement of the system and work included in the Contract. (Do not scale the drawings). Consult the Architectural Drawings and details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the general construction supervisor.
- B. Work under each section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; do not begin work until unsatisfactory conditions are corrected.
- C. Make reasonable modifications in the layout as needed to prevent conflict with work of other Sections of the Specifications or for proper execution of the work.
- D. It shall be understood that the right is reserved by the Architect/Engineer to change the location of equipment and apparatus to a reasonable extent as building conditions may dictate, prior to their installation without extra cost to the Owner.

1.3 SURVEYS AND MEASUREMENTS

- A. Base all measurements, both horizontal and vertical, from established benchmarks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work.
- B. Before proceeding with the work resolve discrepancies between actual measurements and those indicated, which prevent following good practice or intent of the Drawings or Specifications.

1.4 CODES AND STANDARDS – Coordinate with Division 1

- A. The Codes and Standards listed below apply to all Electrical work codes or standards that are mentioned in these Specifications; the latest edition or revision shall be followed:
 - 1. NEMA - Standards
 - 2. ANSI CI - National Electrical Code (NFPA 70)
 - 3. ANSI C50.13 - Rotating Electrical Machinery
 - 4. NEMA MG2 - Construction and guide for selection, installation and use of electric motors.
 - 5. NEMA MG1 - Motors and Generators
- B. The following State and Local Codes shall apply: New York State Uniform Fire Prevention and Building Code, and Local Building Codes.
- C. The following abbreviations are used within this Division of the Specifications:
 - 1. IES - Illuminating Engineering Society.
 - 2. NEC - National Electrical Code
 - 3. ANSI - American National Standards Institute
 - 4. ASTM - American Society for testing and materials
 - 5. EPA - Environmental Protection Agency
 - 6. IEEE - Institute of Electrical and Electronic Engineers
 - 7. NEMA - National Electrical Manufacturers Association
 - 8. NFPA - National Fire Protection Association.
 - 9. OSHA - Occupational Safety and Health Administration
 - 10. UL - Underwriter's Laboratories

1.5 PERMITS AND FEES

- A. Give all necessary notices, obtain all permits and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with work of this Division. File all necessary plans, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction; obtain all necessary certificates of inspections for his work and deliver a copy to the Architect before request for acceptance and final payment for the work. Pay fees for utility construction/connections.
- B. Include in the work, without extra cost to the Owner, any labor, materials, services, and apparatus, Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on the Drawings and/or specified.

- C. All materials furnished and all work installed shall comply with the rules and recommendations of the National Fire Protection Association, with the requirements of the local utility companies, with the recommendations of fire insurance rating organization having jurisdiction and with the requirements of all governmental departments having jurisdiction.
 - D. All materials and equipment for the electrical portion of the mechanical systems shall bear the approval label of or shall be listed by the Underwriter's Laboratories, Inc.
- 1.6 TEMPORARY LIGHT AND POWER – See Division 1
- A. The Contractor shall furnish, install, maintain and, upon direction to do so, remove system of temporary lighting and power for the use of all construction trades.
 - B. The Electrical Contractor shall provide adequate electrical service for the needs of all Contracting Trades.
 - C. Wiring shall be provided for temporary use during building construction, including grounding and fused main cut-off switches. Temporary electric lines with branch switches shall be provided for lighting and for taps for electric tools, pumps and other temporary equipment; all connected to a main line looped through floor spaces and up stair wells or shafts. All power outlets shall be grounded to an equipment ground wire in an approved manner. Electric lines shall be extended to power tools, which cannot be located within reach of extension cords.
 - D. Light bulbs shall be provided in sufficient quantity to light the building for safety purposes. Extension cords shall be provided as may be essential to the proper execution of the work. Temporary lighting shall be provided for all stairs and other locations where needed for safety or the proper execution of the work.
 - E. The Electrical Contractor shall maintain temporary lighting and power systems in good working condition, including the relocation and reinstallation when required to avoid interference with the progress of construction.
 - F. Provide ground-fault personnel ampere protection for all single phase, 15 and 20 ampere receptacles. All receptacles and portable cord connectors shall have NEMA standard locking type configurations.
 - G. The Electrical Contractor shall turn lights on and off at the beginning and end of each working day of any trade unless otherwise directed. He shall arrange for all temporary light and power for all trades which do not have holidays (days off) similar to the electrical trade. The Electrical Contractor shall patch and repair all openings left damaged by the installation and removal of the temporary light and power.
- 1.7 MANUFACTURER'S IDENTIFICATION
- A. Manufacturer's nameplate, name or trademark and address shall be attached permanently to all equipment and materials furnished under this Division. The nameplate of a contractor or distributor may not be used.

1.8 SHOP DRAWINGS – See Division 1

- A. Submit for approval detailed shop drawings of all equipment and materials in accordance with working procedures.
- B. Furnish all necessary templates and patterns for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as necessary.
- C. Submit shop drawings for the following:
 - 1. Light fixtures.
 - 2. Receptacles, switches, occupancy sensors.
 - 3. Overcurrent protective devices.
 - 4. Panelboards.
 - 5. Clocks and P.A. system components.
 - 6. Fire alarm system.

1.9 MATERIALS AND WORKMANSHIP

- A. All materials and apparatus necessary for the work, except as specifically indicated otherwise, shall be new, of first class quality and shall be furnished, delivered, erected, connected and finished in every detail and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first class standard article as accepted by the Architect shall be furnished.
- B. Furnish the services of an experienced Superintendent who shall be constantly in charge of the installation of the work, together with all skilled workmen, helpers, and labor to unload, transfer, erect, connect up, adjust, start, operate and test each system.
- C. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

1.10 PROTECTION

- A. Work under each Section shall include protecting the work and materials of all other Sections from damage from work or workmen and shall include making good all damage thus caused. Be responsible for work and equipment until finally inspected, tested, and accepted; protect work against theft, injury or damage; and carefully store material and equipment received on site, which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing or other foreign material.
- B. Work under each section includes receiving, unloading, uncrating, storing, protecting, setting in place and connecting up completely of any equipment supplied under each section. Work under each section shall also include exercising special care in handling and protecting equipment and fixtures and shall include the cost of replacing any of the above equipment and fixtures which are missing or damaged by reason of mishandling of failure to protect on the part of the Contractor.

1.11 BASES AND SUPPORTS

- A. Unless specifically noted otherwise, provide all necessary supports, pads, bases, and piers required for all equipment under this Division. Provide all temporary bases and supports as required.
- B. All equipment, unless shown otherwise, shall be securely attached to the building structure. Attachments shall be of a strong and durable nature; any attachments that are, insufficient, shall be replaced as directed by the Architect.

1.12 SLEEVES, INSERTS AND ANCHOR BOLTS

- A. All conduits passing through floors, walls or partitions shall be provided with sleeves having an internal diameter one inch larger than the outside diameter of the conduit, or insulation enclosing the conduit.
- B. Furnish all sleeves, inserts, and anchor bolts necessary to be installed under other sections of the Specifications to accommodate work of this section.
- C. Sleeves through outside walls shall be cast iron sleeves with intermediate integral flange. Sleeves shall be set with ends flush with each face of wall. The remaining space shall be packed with oakum to within 2 inches of each face of the wall. The remaining shall be packed and made watertight with a waterproof compound.
- D. Sleeves through concrete floors or interior masonry walls shall be schedule 40 black steel pipe, set flush with finished walls or ceiling surfaces but extending 2 inches above finished floors.
- E. Sleeves through interior partitions shall be 22 gauge galvanized sheet steel, set flush with finished surfaces or partitions.
- F. Inserts shall be individual or strip type of pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4" inch diameter, permitting lateral adjustment. Individual inserts shall have an opening at the top to allow reinforcing rods up to 1/2" diameter to be passed through the insert body. Strip inserts shall have attached rods having hooked ends to allow fastening to reinforcing rods. Inserts shall be as manufactured by Carpenter and Patterson, Inc. or Grinnell Co., Inc.
- G. Penetrations through fire-rated walls, ceilings and floors in which cables, conduits pass, shall be sealed by a UL approved fire stop fitting classified for an hourly rating equal to the fire rating of the floor, wall or ceiling shall be Gedney Fire Seal Type CFSF or CAPS.

1.13 PAINTING – See Division 1; all work required shall be performed by this Contractor.

- A. All finish painting in finished areas shall be performed by others.
- B. All materials shipped to the job site under the Division, such as panels and plates, shall have a prime coat and standard manufacturer's finish unless otherwise specified.
- C. Inaccessible conduits, hangers, supports and anchors and ducts shall be coated prior to installing.

- D. All components of the fire alarm system raceway shall be painted red. This includes but is not limited to conduit, junction boxes, pull boxes.
- 1.14 CUTTING AND PATCHING – See Division 1
- A. All cutting and patching required for the work of this Division shall be done by this Division.
 - B. Work under this Division shall include furnishing, locating and setting inserts and/or sleeves. Do all drilling and cutting necessary for the installation.
 - C. All holes cut through concrete slabs and structural steel shall be punched or drilled from the underside. No structural member shall be cut without the written acceptance of the Architect and all such cutting shall be done in a manner directed by him.
 - D. Refer to Division 1 for additional requirements.
- 1.15 SCAFFOLDING, RIGGING AND HOISTING – Coordinate with Division 1
- A. Furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished under this Division. Remove same from premises when no longer needed.
- 1.16 EXCAVATING AND BACKFILLING
- A. All excavation and backfilling for the work of this Division shall be performed by Division 2.
- 1.17 WATERPROOFING
- A. Where any work penetrates waterproofing, including waterproof concrete and floors in wet areas. Submit proposed method of installation for review by the Architect before beginning work. Furnish all necessary sleeves, caulking and flashing necessary to make opening absolutely watertight.
- 1.18 ACCESSIBILITY AND ACCESS PANELS
- A. Be responsible for the sufficiency of the size of shafts and chases, the adequate thickness of partitions, and the adequate clearance in double partitions and hung ceilings for the proper installation of the work of this Division.
 - B. Locate all equipment which must be serviced, operated or maintained in fully accessible positions. Minor deviations from Drawings may be allowed for better accessibility with approval of the Architect.

1.19 SHUTDOWNS – See Division 1

- A. When installation of a new system necessitates the temporary shutdown of an existing utility operating system the connection of the new system shall be performed at such time as designated by and in consultation with the Utility Company. Work required after normal business hours shall be done so at no additional cost to the Owner.

1.20 CLEANING - Coordinate with Division 1

- A. Thoroughly clean all equipment of all foreign substances inside and out before being placed in operation.
- B. If any foreign matter should stop any part of a system after being placed in operation, the system shall be disconnected, cleaned and reconnected whenever necessary to locate and remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.
- C. Upon completion of work remove from the premises all rubbish, debris, and excess materials. Any oil or grease stains on floor areas caused by work of this Division shall be removed and floor areas left clean.

1.21 RECORD DRAWINGS – Work shall be governed by requirements set forth in Division 1

- A. Maintain at the job site a record set of Electrical Drawings on which any changes in location of equipment, panels, devices, and major conduits shall be recorded. Indicate dimensions of all items installed underground or in concrete.

1.22 OPERATING INSTRUCTIONS – Coordinate with requirements set forth in Division 1

- A. Upon completion of all work and all tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, he shall instruct the Owner or his representative fully in the operation, adjustment and maintenance of all equipment furnished. Give at least 7 days notice to the Owner in advance of this period.
- B. The manufacturer shall attest in writing that his equipment has been properly installed prior to start. The following is some of the equipment necessary for this inspection: fire alarm system. These letters will be bound into the operating and maintenance books.

1.23 ADJUSTING AND TESTING

- A. After all equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests as will assure the Architect that they are in proper adjustment and in satisfactory permanent operating condition.
- B. This particular work shall include the services of a factory engineer to inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, there shall be

furnished the service of said engineer for the purpose of supervising the initial operation of the equipment and to instruct the personnel responsible for operation and maintenance of the equipment.

- C. At the completion of the job when all panels, devices, etc. are at full working load the Contractor shall provide infrared scan thermographic inspection test of all connection points, terminals, etc. of wires #8 AWG and larger to detect "hot-spots" in the electrical current flow. Correct all hot-spots.

1.24 UNDERWRITER'S LABEL

- A. All electrical equipment and materials shall be new and shall comply with the standards of and shall bear the label of the Underwriter's Laboratories.

1.25 ELECTRICAL SAFETY INSPECTION

- A. Electrical Contractor shall arrange for an Electrical Safety Inspection to be performed by the Local Inspection Agency (i.e.: New York Electrical Inspection Services, Atlantic Inland, Middle Department Inspection Agency). A Certificate of Compliance "Underwriter's Certificate" shall be issued to the Owner. All costs and coordination required shall be included in this Contractors Base Bid.

1.26 REMOVALS – Coordinate with Division 1 and Division 2

- A. The scope of removals shown on the Drawings are diagrammatic only and indicate the intent of the work to be performed and not the complete scope of demolition and/or removal work. It shall be the responsibility of this Contractor to remove any electrical devices even if not specifically indicated to be removed on these Drawings in order to accommodate new work.
- B. All power conductors, control wiring and conduit associated with mechanical equipment such as fans, pumps, etc. designated for removal on the HVAC Drawings shall be removed clear back to the source of power and disconnected. All motor starters, disconnect switches, control devices, etc. shall be removed. Refer to HVAC Drawings for extent of HVAC removals.
- C. Any device removed shall include (but shall not be limited to) the removal of all associated wiring, conduit, boxes, and auxiliary devices back to the previous device on the circuit, or back to the panelboard or origin of the circuit or any other items that are not incorporated in new layout, until such removal is complete. If the removal of any device interrupts service of any other device that is to remain, the Contractor shall provide all materials and labor to ensure continuity of service to those devices to remain.
- D. Junction boxes, pullboxes, wireways, conduits, or any other devices required to reconnect circuitry shall be installed concealed within the ceilings, partitions and/or walls, floors, no surface or exposed circuiting shall be permitted, unless specifically indicated.

- E. The Electrical Contractor shall patch all openings in walls, ceilings or roof that are left open as a result of removals. Refer to cutting and patching section.
- F. Any electrical device removed including but not limited to disconnect switches, panelboards, etc. shall be cleaned, protected and turned over to the Owner or disposed of as directed by Owner.

END OF SECTION 260100

SECTION 260125 - SCOPE OF WORK

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 SCOPE OF WORK

- A. The work under this section includes all labor, materials, equipment, tools, transportation and the performance of all work necessary and required for furnishing and installing all Electrical work shown on the Contract Documents, as specified herein and as otherwise required by job conditions or reasonably implied, including, but not necessarily limited to the following:
1. The addition of new fire alarm devices (i.e., automatic fan shutdown, for new HVAC equipment) and the replacement of the existing ones as shown on Drawings.
 2. Installation of a new utility pad mounted transformer lineup (provide platform).
 3. Installation of new service cables in underground duct bank.
 4. Installation on new medium voltage cables in underground duct bank, supplying the new utility stepdown transformer from the last utility pole.
 5. The contractor shall dispose of all debris, including but not limited to fixtures, equipment, lamps, ballast, wiring devices and the like in accordance with, as defined by governing law and regulations of the jurisdiction where the work is being performed.
 6. Provisions for temporary fire prevention actions to be taken during the period of construction until the new fire alarm system is operational.
 7. New electrical service as indicated on drawings.
 8. Modifications to existing electrical distribution system as indicated on the Drawings.
 9. Service switchboards, distribution panelboard, circuit breaker panelboards, feeder, conduit, cables, and branch circuit wiring with all connections complete.
 10. Conduit, conduit fittings, junction and pull boxes and all appurtenances necessary for the raceway systems including necessary supports and fasteners.
 11. Electrical conductors, connectors, fittings and connection lugs.
 12. Branch circuit devices, outlet boxes, pull boxes, motor disconnect switches, etc.

13. Power wiring to HVAC and Plumbing equipment including disconnect switches as shown and/or required by NEC.
 14. Empty conduit for computer and telephone.
 15. Lighting fixtures, lamps and occupancy sensor.
 16. Public address speakers and clocks to match existing.
 17. Temporary electric power while existing electrical service is being removed until the new electrical service is being installed.
 18. Core drilled holes for conduit passing through walls, ceilings, and floors.
 19. All necessary cutting, patching and core drilling incidental to the electrical work.
 20. Temporary light and power.
 21. Licenses, permits, inspection and approvals.
 22. Grounding as required as per NEC.
 23. Sleeves for conduit and watertight caulking between conduit and sleeve.
 24. Testing.
 25. Cutting, patching and drilling.
- B. Coordination Drawings (if applicable): Attention is directed to Division 1 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- 1.2 WORK NOT INCLUDED
- A. The following related items will be done by others:
1. Furnishing motors and controllers.
 2. Concrete work.

END OF SECTION 260125

SECTION 260150 - APPROVED MANUFACTURERS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 APPROVED MANUFACTURERS

A. The following list of manufacturers constitutes an approved list:

- | | | |
|-----|--------------------------|--|
| 1. | Panelboards | Siemens, Square D, GE |
| 2. | Disconnect Switches | Siemens, Square D, GE |
| 3. | Conduit (steel) | Wheatland, Allied, Republic Conduit |
| 4. | Conduit Fittings (steel) | Appleton, Crouse-Hind, O-Z, T&B, M&W |
| 5. | Wire and Cable | General, South Wire, Rome, Cerro |
| 6. | Splicing Connectors | 3M, O-Z, Thomas & Betts |
| 7. | Outlet Boxes | Appleton, National, Steel City, Raco |
| 8. | Wiring Devices | Arrow-Hart, Hubbell, P & S |
| 9. | Fuses | Bussman, Ferraz-Shawmut, Littlefuse |
| 10. | Lamp | GE, Sylvania, Philips |
| 11. | Motion Sensors | Watt Stopper, Sensorswitch |
| 12. | Fluorescent Ballasts | GE, Universal, Advance |
| 13. | Fire Alarm System | Simplex-Grinnell, Pyrotronics, Edwards System Technologies or approved equal |

B. All materials and appliances shall have listing of Underwriters Laboratories, Inc. and be so labeled, or shall conform to their requirements, in which case certified statements to that effect shall be furnished by the manufacturer with a copy of an examination report by a recognized independent testing laboratory acceptable to the Architect and his Engineer. Use new materials and appliances throughout.

C. Where several types or makes of materials are specified, the Contractor has the option of using any of these, but after a type or make has been selected and has received the approval of the Architect, it shall be used throughout.

- D. The Contractor shall provide all structural supports for the proper attachment of equipment supplied by him and also for all equipment supplied to him under other sections of the Specifications for mounting and connections.
- E. Secure all equipment to the building structure independently. Do not secure to work of other trades such as ceiling lath, piping racks, etc., unless specified or noted otherwise.
- F. Wall mounted equipment shall be directly secured to wall by means of steel bolts. Maintain at least 1/4" air space between equipment and supporting wall. Pre-fabricated steel channels providing a high degree of mounting flexibility, such as those manufactured by Kindorf and Unistrut, shall be used for mounting arrays of equipment.
- G. All fastening, supports, hangers, anchors, etc., shall be of a type made for the specific purpose. On masonry walls, metallic expansion shield and machine screws shall be used. Screws with wooden plugs or anchors will not be acceptable on any part of the work.

END OF SECTION 260150

SECTION 260200 - CONDUIT

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install rigid metal conduit, electrical metallic tubing and liquid tight flexible metal conduit, including all fittings to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

- A. Cutting and patching.
- B. Trenching: Excavation and backfill for conduit and utility on site.
- C. Sheet metal flashing and trim.

1.3 REFERENCE FOR METAL RACEWAY

- A. UL 5 - Surface Metal Raceways and Fittings.
- B. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings.

PART 2 - PRODUCTS

2.1 RIGID STEEL CONDUIT

- A. Industry standard heavy wall conduit.
- B. Minimum 3/4" trade size.
- C. Threaded.
- D. Hot dipped galvanized finish by means of plating after cutting of threads.

2.2 INTERMEDIATE METAL CONDUIT

- A. Industry standard steel conduit.
- B. Minimum 3/4" trade size.
- C. Threaded.
- D. Hot dipped galvanized finish by means of plating after cutting of threads.

2.3 ELECTRICAL METALLIC TUBING

- A. Industry standard thin wall conduit of galvanized steel only.
- B. Minimum 3/4" trade size.
- C. Maximum 4" trade size.

2.4 FLEXIBLE METAL CONDUIT

- A. Galvanized steel tape formed into an industry standard interlocking coil.
- B. Minimum 3/4" trade size except for connection of lighting fixtures.
- C. Grounding type.
- D. Separate ground conductor.
- E. Use for short connections to motor terminal box, other vibrating equipment using a minimum length of 18" with 50% slack and a maximum of 6'.
- F. From outlet box to recessed lighting fixtures with a maximum length of 6'.

2.5 WIREWAYS

- A. Lay-in type, UL listed as wireway or auxiliary gutter.
- B. Wireway shall be of code gauge steel construction (UL standard for Wireway Auxiliary Gutters and Associated Fittings) with removable cover. Tamperproof screws shall be provided for sealing covers to prevent access by unauthorized personnel. Wireway shall be provided with knockouts.
- C. Connector and covers shall be attached so that removal of connectors is not necessary to utilize the lay-in feature.
- D. Finish: All sheet metal parts shall be provided with a rust inhibiting phosphating coating and baked enamel finish. All hardware shall be plated to prevent corrosion. All screws extending into the wireway shall be protected by spring nuts or otherwise guarded to prevent wire insulation damage.

2.6 CONDUIT SUPPORTS

- A. Conduit clamps, straps and supports: Steel or malleable iron.

2.7 CONDUIT FITTINGS

- A. Use compression fittings for all EMT in exposed areas. Utilize set screw fittings only above hung ceilings and concealed areas.

2.8 SURFACE METAL RACEWAY

- A. Metal raceway shall be of a two-piece design with a base and snap-on cover.
- B. Raceway and all components shall be listed by Underwriters Laboratories.
- C. Single Channel: Steel, zinc plated, off-white finish suitable for repainting. Two piece design with metal base and snap-on cover. Wire Mold V700, Hubbell Inc. 750 Series, or Panduit PMR5/PMR7.
- D. Dual Channel: Steel, galvanized, off-white finish but suitable for repainting. Two-piece design with metal base and snap-on cover, minimum 0.04" thick base and cover. Base shall be divided by a removable barrier section. Provide duplex receptacles mounted in top cell and communication outlets in the bottom cell. Coordinate communications jack requirements with owner's IT personnel. Wiremold V4000, Wiremold DS4000 Series, Hubbell Inc. 4000 Series or Panduit PMR40.

PART 3 - EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

- A. Minimum size - 3/4". Provide grounding bushings on all conduits 1-1/4" and larger.
- B. Arrange conduit to maintain headroom and present a neat appearance.
- C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
- D. Draw up couplings and fittings full and tight. Protect threads cut in field from corrosion. Paint newly threaded joints of steel conduit with T & B "Kopershield" compound before installation. Running threads prohibited; use three-piece unions or split couplings instead. Use only compression fittings for all EMT in areas where it will be exposed in finished and unfinished areas. Provide set screw fittings only when installed above hung ceilings.
- E. Maintain minimum 6-inch clearance between conduit and piping. Maintain 12-inch clearance between conduit and heat sources such as flues; steam pipes and heating appliances.
- F. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
- G. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.
- H. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

- I. Exposed conduit on ceiling shall be parallel or perpendicular to wall and vice versa to ceiling when installed on wall. Secure conduit clamps and supports to masonry materials by toggle bolt, expansion bolt or steel insert. Spacing of conduit supports shall not exceed 7 feet.

3.2 CONDUIT INSTALLATION

- A. Cut conduit square using a saw or pipe cutter, Deburr cut ends.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp or wet locations.
- D. Install no more than the equivalent of three 90-degree bends between boxes.
- E. Use conduit bodies to make sharp changes in direction, as around beams.
- F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2-inch size.
- G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- I. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.
- J. Install expansion-deflection joints where conduit crosses building expansion or seismic joints.
- K. Where conduit penetrates fire-rated walls and floors, provide pipe sleeves two sizes larger than conduit; Pack void around conduit with fire-stop fittings with UL listed fire rating equal to wall or floor ratings; Seal opening around conduit with UL listed foamed silicone elastomer compound.
- L. Installation of conduit in slab shall comply with ACI 318.
- M. Route conduit through roof openings for piping and duct work where possible; otherwise, route through roof with pitch pocket.
- N. Maximum size conduit in slabs above grade: 1 inch. Do not route conduits to cross each other in slabs above grade. Conduits crossing each other may not be larger than 3/4 inch.
- O. All conduit used for fire alarm system shall be painted red.

P. For Surface Metal Raceway

1. When installing surface metal raceway contractor shall provide boxes from the same manufacturer of the surface metal raceway.
2. Install separate grounding conductor. Grounding conductors for surface metal raceways.
3. Surface metallic raceways in close proximity of other trades, shall be arranged to allow for proper clearance for servicing and headroom. Surface metallic raceway shall be installed parallel to walls, floors and ceilings in a neat workmanlike manner.

3.3 CONDUIT INSTALLATION OF SCHEDULE

- A. Underground installations: PVC minimum Schedule 40, unless otherwise noted on Drawings.
- B. Installations in or under concrete slab: PVC minimum Schedule 40, unless otherwise noted on Drawings.
- C. Exposed outdoor locations: Rigid galvanized steel conduit.
- D. Wet interior locations: Rigid galvanized steel conduit.
- E. Concealed dry interior locations and above accessible ceiling for receptacle and lighting branch wiring: Electrical metallic tubing up to first junction box and flexible metallic tubing (MC cable only) thereafter.
- F. Concealed dry interior locations other than receptacle and lighting branch wiring: Electrical metallic tubing.
- G. Concealed dry interior locations and above accessible ceiling for fire alarm runs: Fire alarm armored cable type MC with red stripe as manufactured by AFC series 1800.
- H. Concealed and exposed dry interior location for feeder runs: Electric metallic tubing.
- I. Exposed dry interior in unfinished locations other than Boiler Rooms: Electric metallic tubing.
- J. Final connections to motors: Flexible metallic tubing (MC cable). Minimum of 10" to maximum of 6' for connections to motors.
- K. Existing exposed dry interior locations (finished spaces), for branch wiring and fire alarm wiring, one-piece steel raceway (similar to Wiremold V-500, V-700).
- L. Final connections to motors: Flexible metallic tubing (MC cable). Minimum of 18" to maximum of 6' for connections to motors.

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- M. All conduit installed in boiler room up to 10'-0" AFF and lower shall be rigid galvanized steel conduit. All conduit above 10'-0" shall be electric metallic tubing.

- N. Final connections to equipment and/or motors in boiler room, outdoors and potentially wet indoor areas: liquid tight, flexible; minimum of 18" to maximum 6'-0" connections.

END OF SECTION 260200

SECTION 260250 - DUCT BANK

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SECTION INCLUDES

- A. PVC conduit.
- B. Duct.
- C. Manholes.

1.2 REFERENCES

ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.

- A. ASTM A48 - Gray Iron Castings.
- B. ASTM C857 - Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
- C. ASTM C858 - Underground Precast Concrete Utility Structures.
- D. ASTM C891 - Installation of Underground Precast Utility Structures.
- E. ASTM C1037 - Inspection of Underground Precast Utility Structures.
- F. IEEE C2 - National Electrical Safety Code.
- G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- H. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- I. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- J. NEMA TC 6 - PVC and ABS Plastic Utilities Duct for Underground Installation.
- K. NEMA TC 9 - Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.
- L. NEMA TC 10 - PVC and ABS Plastic Communications Duct and Fittings for Underground Installation.
- M. NEMA TC 14 - Filament-Wound Reinforced Thermosetting Resin Conduit and Fittings.

- N. NFPA 70 - National Electrical Code.
- O. UL 651A - Type EB and A PVC Conduit and HDPE Conduit.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience, and with service facilities within 100 miles of Project.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc.

1.5 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated.
- B. Verify routing and termination locations of duct bank prior to excavation for rough-in.
- C. Verify locations of manholes prior to excavating for installation.
- D. Duct bank routing is shown in approximate locations unless dimensions are indicated. Route as required to complete duct system.
- E. Manhole locations are shown in approximate locations unless dimensions are indicated. Locate as required to complete ductbank system.

PART 2 - PRODUCTS

2.1 PVC CONDUIT

- A. Manufacturers:
 - 1. Carlon.
- B. Rigid Plastic Conduit: NEMA TC 2, Schedule 40 PVC, with fittings and conduit bodies to NEMA TC 3.
- C. Rigid Plastic Underground Conduit: UL 651A, Type A PVC High-density polyethylene, Schedule 40.

2.2 PRECAST CONCRETE MANHOLES

- A. Manufacturers:
 - 1. A.C. Miller or equal.

- B. Description: Precast manhole designed in accordance with ASTM C858, comprising modular, interlocking sections complete with accessories.
- C. Loading: ASTM C857, Class A-16.
- D. Shape: Rectangular with truncated corners.
- E. Nominal Inside Dimensions: 10 feet x 6 feet.
- F. Corner Panel Dimensions: 3 feet wide.
- G. Inside Depth: 6 feet.
- H. Wall Thickness: 6 inches.
- I. Base Section: Include 3 inches deep x 14 inches round sump with cast sleeve, and two 1 inch ground rod openings. Provide 4 inches diameter hole in bottom of manhole.
- J. Top Section: Include 39 inches diameter grooved opening for frame and cover.
- K. Riser Casting: 12 inches with manhole step cast into frame.
- L. Frames and Covers: ASTM A48; Class 30B gray cast iron, 30 inches size, machine finished with flat bearing surfaces. Provide cover marked ELECTRIC OR TELEPHONE.
- M. Duct Entry Provisions: Window knockouts.
- N. Duct Entry Locations: As indicated.
- O. Duct Entry Size: 6 inches.
- P. Cable Pulling Irons: Use galvanized rod and hardware. Locate opposite each duct entry. Provide watertight seal.
- Q. Cable Rack Inserts: Minimum load rating of 800 pounds. Locate on center.
- R. Cable Rack Mounting Channel: 1-1/2 x 3/4 inch steel channel, 48 inch length. Provide cable rack arm mounting slots on 1-1/2 inch centers.
- S. Cable Racks: Steel channel, 1-1/2 x 3/4 x 14 inches, with fastener to match mounting channel.
- T. Cable Supports: Porcelain clamps and saddles.
- U. Manhole Steps: Cast steps at 12 inches on center vertically.
- V. Sump Covers: ASTM A48; Class 30B gray cast iron.
- W. Source Quality Control: Inspect manholes in accordance with ASTM C1037.

2.3 ACCESSORIES

- A. Underground Warning Tape: 4 inch wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.
- B. Install a 6" deep bed of 3/4" crushed stone under each manhole.

2.4 CAST-IN-PLACE MANHOLE ACCESSORIES

- A. Sump Covers: ASTM A48; Class 30B gray cast iron.

PART 3 - EXECUTION

3.1 DUCT BANK INSTALLATION

- A. Install duct to locate top of ductbank at depths as indicated on drawings.
- B. Install duct with minimum slope of 4 inches per 100 feet. Slope duct away from building entrances.
- C. Cut duct square using saw or pipe cutter; de-burr cut ends.
- D. Insert duct to shoulder of fittings; fasten securely.
- E. Join nonmetallic duct using adhesive as recommended by manufacturer.
- F. Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- G. Install no more than equivalent of three 90-degree bends between pull points.
- H. Provide suitable fittings to accommodate expansion and deflection where required.
- I. Terminate duct at manhole entries using end bell.
- J. Stagger duct joints vertically in concrete encasement 3 inches minimum.
- K. Use suitable separators and chairs installed not greater than 5 feet on centers.
- L. Band ducts together before placing concrete.
- M. Securely anchor duct to prevent movement during concrete placement.
- N. Place 3000 p.s.i. concrete around PVC conduits. Use mineral pigment to color concrete red.
- O. Provide minimum 3" concrete cover at bottom, top, and sides of ductbank.
- P. Provide two (2) No. 4 steel reinforcing bars in top of bank under paved areas.

- Q. Connect to manhole wall using dowels.
- R. Provide 2 at pull rope in each empty duct except sleeves and nipples.
- S. Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.
- T. Backfill trenches with clean tamped soil.
- U. Interface installation of underground warning tape with backfilling. Install tape 6 inches below finished surface.

3.2 PRE-CAST MANHOLE INSTALLATION

- A. Excavate for manhole installation.
- B. Install and seal precast sections in accordance with ASTM C891.
- C. Install manholes plumb.
- D. Use precast neck and shaft sections to bring manhole cover to finished elevation.
- E. Attach cable racks to inserts after manhole installation is complete.
- F. Install 4" diameter drains in manholes and connect to site drainage system 4 inch pipe terminating in 1/3 cu yd crushed gravel bed.
- G. Damp-proof exterior surfaces, joints, and interruptions of manholes after concrete has cured 28 days.
- H. Backfill manhole excavation.

END OF SECTION 260250

SECTION 260300 - WIRE AND CABLE

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to wire and cable in raceway specified in other sections to complete all work shown on the Drawings or specified herein.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. Thermoplastic-insulated building wire: Type THHN.
- B. Rubber insulated building wire: NEMA WC 3.
- C. Feeders and branch circuits larger than number 6 AWG: Copper, stranded conductor, 600 volt insulation, type THHN.
- D. Feeder and branch circuits 6 AWG and smaller: Copper conductor, 600 volt insulation, THWN/THHN, 6 and 8 AWG, stranded conductor; Smaller than 8 AWG, solid conductor.
- E. Service feeders and branch circuits in conduit in contact with earth shall be type XHHW.
- F. Control circuits: Copper, stranded conductor 600 volt insulation, THHN.

2.2 ARMORED CABLE

- A. BX or pre-manufactured cables are not acceptable except for Type MC for branch wiring after the first junction box (for receptacle and lighting branch circuits) and final connections to motors in interior dry accessible locations, minimum length shall be 18" with a maximum length of 6' for motors. Except for outdoor and boiler room equipment and/or motors. Provide flexible liquid tight conduit.
- B. Type MC fire alarm cable with red stripe for concealed fire alarm wiring as manufactured by AFC series 1800.
- C. Armored cable, Type MC size 14 through 6 AWG: Copper conductor, 600 volt thermoplastic insulation, rated 90 degrees C., with separate green ground conductor.

2.3 REMOTE CONTROL AND SIGNAL CABLE

- A. Control cable for class 2 or class 3 remote control and signal circuits:

1. Copper conductor, 300 volt insulation, rated 60 degree C, individual conductors twisted together shielded and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts and plenums. Verify wiring type with manufacturer.

2.4 COLOR CODING

- A. All wiring shall be color-coded. Neutral wire shall be white throughout and each phase wire shall be identified any place in the system by its color code. All conductors in panel boxes and junction boxes shall be properly tagged with red non-flammable tags properly attached.

- B. Wire shall be color coded as follows:

<u>120/208 volt system</u>		<u>480/277 volt system</u>		<u>Fire Alarm</u>
A Phase	Black	A Phase	Brown	Red
B Phase	Red	B Phase	Orange	
C Phase	Blue	C Phase	Yellow	

- C. Equipment ground wires or ground jumpers shall be Green.
- D. In addition to the basic color-coding described the following additional identification and tagging shall apply.
 1. The switch legs for the local wall switches and in switch panel shall have distinctive stripes. In instances where color-coding is not practicable, such as short runs of heavy feeder cables, taping the ends of the cable with coded colors as indicated above or tagging will be permitted.
 2. Cables shall be tagged in all pull boxes, wireways and wiring gutters of panels.
 3. Where two (2) or more circuits run to or through a control device, outlet box or junction box, each circuit shall be tagged as a guide in making connections.
 4. Tags shall identify wire or cable by number and/or piece of equipment served as shown on the Drawings.

PART 3 - EXECUTION

3.1 GENERAL WIRING METHODS

- A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.
- B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet and for 20 ampere.
- C. Use 10 AWG conductor for 20 ampere, 277 volt branch circuit home runs longer than 200 feet for 20 ampere.

- D. Place an equal number of conductors for each phase of a circuit in same raceway or cable. No more than one of each phase shall be supported by a single neutral.
- E. Splice only in junction or outlet boxes.
- F. Neatly tag, identify, train and lace wiring inside boxes, equipment and panelboards.
- G. Make conductor lengths for parallel circuits equal.

3.2 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricate for pulling 4 AWG and larger wires.
- B. Completely and thoroughly swab raceway system before installing conductors.
- C. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

3.3 CABLE INSTALLATION

- A. Support cables above accessible ceilings; do not rest on ceiling tiles. Use spring metal clips or metal cable ties to support cables from structure (not ceiling suspension system). Include bridle rings or drive rings.
- B. Use suitable cable fitting and connectors.

3.4 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice only in accessible junction boxes.
- B. Use solderless pressure connections with insulating covers for copper wire splices and tape, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.
- C. Provide extended gutters and tap blocks or pull boxes with tap rail systems similar to Burndy MT Series or Burndy Electrorail system for wire splices 6 AWG and larger.
- D. Tape uninsulated conductors with electrical tape to 150 percent of the insulation value of conductor.
- E. Thoroughly clean wires before installing lugs and connectors.
- F. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
- G. Terminate spare conductors with electrical tape.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of the Specifications.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Torque test conductor connections and terminations to manufacturer's recommended values.
- D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

3.6 WIRE AND CABLE INSTALLATION SCHEDULE

- A. All wiring and cable shall be installed in conduit unless otherwise noted. Refer to conduit section 26 02 00 for conduit types at various locations.

END OF SECTION 260300

SECTION 260320 - OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. Work of this section includes all labor, materials, equipment and services necessary to complete the electrical work as shown of the Drawings and specified herein, including, but not limited to, the following:
- B. Fuses
 - 1. Current limiting cartridge fuses.
 - 2. Time delay cartridge fuses.
- C. Circuit Breakers
 - 1. Standard molded case circuit breakers "bolted in" type.
 - 2. Solid state circuit breakers.
 - 3. Current limiting circuit breakers.
 - 4. Enclosed circuit breakers.

1.2 SUBMITTALS

- A. Shop drawings showing dimensions, location of equipment and method of installation.
- B. Product Data: Manufacturer's printed data, catalog cuts.

1.3 DISCONNECT SWITCHES

- A. Fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover when switch is in ON position. Handle lockable in OFF position. Fuse clips shall be designed to accommodate Class R, J fuses.
- B. Non-fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover when switch is in ON position. Handle lockable in OFF position.
- C. Enclosures: NEMA Type 1, 3R or 4 as required.

1.4 FUSES

- A. Voltage ratings of fuses shall be suitable for the supply characteristics to which they are applied.

- B. Fuse type and size shall be suitable for installation in related disconnect switch or circuit breaker.
- C. Current limiting fuses shall be as follows:
 - 1. Regardless of actual available fault current, they shall, at full recovery voltage, be capable of safely interrupting fault currents of 200,000 amperes RMS symmetrical or 280,000 amperes RMS asymmetrical, deliverable at the line side of the fuse.
 - 2. They shall have average melting time-current characteristics to meet the Underwriters' Laboratories requirements for "Class RK-1" 0-600 amp fuses.
- D. Regardless of actual available fault current, they shall be capable of limiting peak let through current to the following values based on 200,000 amperes RMS symmetrical or 280,000 amperes asymmetrical being available:

<u>Rating In Amperes</u>	<u>Peak Let Through Current In Amps</u>
15-30	6,000
35-50	8,000
70-100	12,000
125-200	20,000
225-601	38,000

- E. Fuses shall be rejection type. Fuse clip shall be rejection type.
- F. Fuse Type and Application Table:

<u>Category of Application</u>	<u>Acceptable Fuse Types</u> (Bussman Designations @ 600V)
Motor feeder	LPS below 600A
Power panel feeders	LPS below 600A
Safety switches	LPS

1.5 CIRCUIT BREAKERS

- A. "Bolted-In" type, manually operated, quick-make, quick-break, mechanically trip-free operating mechanisms for simultaneous operation, of all poles, with contacts, arc interrupters and trip elements for each pole. "Plug-in" breakers are not permitted. New circuit breakers to be installed in existing panelboards shall be U.L. certified for installation in those panelboards and be labeled with make and model.
- B. Tripping units shall be "thermal-magnetic" type having bimetallic elements for time delay overload protection, and magnetic elements for short circuit protection.
- C. Manually operable by mean of toggle type operating handles having tripped positions midway between the "on-off" position. Handle to be clearly labeled as to breaker rating.
- D. Minimum frame size for all circuit breakers, 1, 2, or 3 pole shall be 100 amperes.

- E. Their interrupting rating shall not be less than 25,000 amperes RMS symmetrical at 208 volt for distribution panels and 10,000 amperes for power panels.

1.6 APPLICATIONS

A. Category of Application for Fuses:

1. Feeders on switchboards.
2. Branch fused switch unit in distribution panel.
3. Fused safety switch.
4. Combination motor starters.

B. Category of Application for Circuit Breakers:

1. Panelboards.
2. Switchboards.
3. Individual enclosures.
4. Combination motor starters.

1.7 SPARE FUSES

- A. Upon Engineer's acceptance of the electrical distribution system, provide spare fuses as follows: 10% of each type and rating installed 600 amperes and smaller (minimum of 3). Provide spare fuse cabinet with directory to store all spare fuses. Locate as directed by Engineer and/or Owner.

1.8 APPROVED MANUFACTURERS

- A. Fuses: Bussman, Ferraz-Shawmut.
- B. Circuit Breakers: Siemens, General Electric, Square D.

1.9 INSTALLATION

- A. All material installation shall be in accordance with manufacturer recommendations and the provisions of all applicable codes.
- B. All fuses and circuit breakers shall be selectively coordinated.
- C. Install disconnect switches where indicated on Drawings.
- D. Install fuses in fusible disconnect switches.
- E. Disconnects shall have NEMA 3R enclosure.

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1.10 RECORD DRAWINGS

- A. Shop drawings showing dimensions, location of equipment and method of installation.
- B. Product Data: Manufacturer's printed data, catalog cuts, performance curves.

END OF SECTION 260320

SECTION 260350 - BOXES

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install wall and ceiling outlet boxes, floor boxes, pull and junction boxes to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

- A. Access doors.
- B. Wiring devices: Service fittings and fire-rated poke-through fittings for floor boxes.
- C. Cabinets and enclosures.

PART 2 - PRODUCTS

2.1 OUTLET BOXES

- A. Sheet metal outlet boxes: ANSI/NEMA OS 1; Galvanized steel, with 1/2 inch male fixture studs where required.
- B. Cast boxes: Cast ferrous alloy, deep type, gasketed cover, threaded hubs.
- C. Typical receptacle box shall be 4" square metal boxes, 30.8 cubic inch capacity with brackets as required. Provide 4" square raised device covers.

2.2 PULL AND JUNCTION BOXES

- A. Sheet metal boxes: ANSI/NEMA OS 1; Galvanized steel.
- B. Sheet metal boxes larger than 12 inches in any dimension: hinged enclosure in accordance with Section 26 04 50.
- C. Cast metal boxes for outdoor and wet location installations: NEMA 250; Type 4 and type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
- D. Cast metal boxes for underground installation: NEMA 250; Type 4, inside flanged, recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron box and plain cover with neoprene gasket and stainless cover screws.

PART 3 - EXECUTION

3.1 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as required in excess of that shown on Drawings and as required for splices, taps, wire pulling, equipment connections and code compliance.
- B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.
- C. Locate and install boxes to allow access. Where installations are accessible, coordinate locations and sizes of required access doors with Division 1.
- D. Locate and install to maintain headroom and to present neat appearance.

3.2 OUTLET BOX INSTALLATION

- A. Do not install boxes back-to-back in walls. Provide minimum 6 inch separation, except provide minimum 24 inch separation in acoustic-rated walls.
- B. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.
- C. Provide knockout closures for unused openings.
- D. Support boxes independently of conduit except for cast iron boxes that are connected of rigid metal conduits, both supported within 12 inches of box.
- E. Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- F. Install boxes in wall without damaging wall insulation.
- G. Coordinate mounting heights and locations of outlets mounted above counters, benches and backspaces.
- H. Position outlets to locate luminaries as shown on reflected ceiling plans.
- I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.
- J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
- K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

- L. Provide cast outlet boxes in exterior locations exposed to the weather and wet locations.

3.3 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
- B. Support pull and junction boxes independent of conduit.

3.4 FLOOR BOX INSTALLATION

- A. Set boxes level and flush with finish flooring material.
- B. Use cast iron floor boxes for installation in slab on grade.

END OF SECTION 260350

SECTION 260400 - WIRING DEVICES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install receptacles, service fittings device plates and box covers to complete all work shown on the Drawings or specified herein.

1.2 REFERENCES

- A. FS W-C-596 - Electrical power connector, plug, receptacles and cable outlet.
- B. FS W-S-896 - Switch, toggle.
- C. NEMA WD 1 - General purpose wiring devices.
- D. NEMA WD 5 - Specific-purpose wiring devices.

1.3 SUBMITTALS

- A. Submit product data under Provisions of Contract and Division 1.
- B. Provide product data showing configurations, finishes, dimensions and manufacturer's instructions.

PART 2 - PRODUCTS

2.1 RECEPTACLES

- A. Convenience and straight-blade receptacles: 125 V, 2 pole, 3 wire, 20 ampere specification grade, ground fault interrupting or isolated ground type.
- B. Internal ground clip of receptacles shall be in one piece with the receptacle mounts.
- C. Receptacles with riveted ground clips will not be accepted.
- D. Isolated ground type receptacle shall be orange in color.

2.2 WALL SWITCHES

- A. Wall switches for lighting circuits and motor loads under 1/2 hp: AC general use snap switch with toggle handle, rated 20 amperes and 120-277 volts AC.
- B. Handle: Ivory plastic.

C. Pilot light type: Lighted handle. Pilot strap in adjacent gang.

D. Locator type: Lighted handle.

2.3 COVER PLATES

A. Decorative cover plate: Stainless steel 302/304 smooth Hubbell "S" series.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install receptacles on roof along parapet wall.

B. Install specific use receptacles at heights shown on contract drawings.

C. Drill opening for poke - through fitting installation in accordance with manufacturer's instructions.

D. Install plates on switch, receptacle, and blank outlets in finished areas, using jumbo size plates for outlets installed in masonry walls.

E. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings and on surface mounted outlets.

F. Install devices and wall plates flush and level.

END OF SECTION 260400

SECTION 260425 - DIGITAL LIGHTING CONTROL SYSTEM

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 SECTION INCLUDES

- A. Single space wireless lighting control systems and associated components:
 - 1. Wireless occupancy/vacancy sensors.
 - 2. Wireless daylight sensors.
 - 3. Wired load control modules with wireless communication inputs.
 - a. Includes fixture control modules with wired occupancy/vacancy/daylight sensors.
 - 4. Wired receptacles with wireless communication inputs.
 - 5. Wireless fixture control components factory-installed in luminaires not specified in this section.
 - 6. Wired wall dimmers and switches with wireless communication inputs.
 - 7. Wired wallbox occupancy sensors with wireless communication inputs.
 - 8. Wireless control stations.
 - 9. Fluorescent electronic dimming ballasts.
 - 10. LED Drivers.
 - 11. Power interfaces.
 - 12. Digital dimming ballast modules.
- B. Wireless hub(s) for centralized control, monitoring, and system integration.
- C. Software data and analytics dashboard, including server requirements.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 50 - *Identification for Electrical Systems*: Identification products and requirements.
- B. Section 26 03 00 - *Wiring Devices - Lutron*:
 - 1. Finish requirements for wall controls specified in this section.
 - 2. Accessory receptacles and wallplates, to match lighting controls specified in this section.
- C. Section 26 05 75 - *Luminaires, Ballasts, and Drivers - Lutron*.

1.3 REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; *current edition*.
- B. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; *2011*.
- C. ANSI/ESD S20.20 - Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices); *2014*.
- D. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; *2002a (Reapproved 2010)*.

- E. CAL TITLE 24 P6 – California Code of Regulations, Title 24, Part 6 (California Energy Code); 2013.
- F. CSA C22.2 No. 223 – Power Supplies with Extra-low-voltage Class 2 Outputs; 2015.
- G. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements; 2015.
- H. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; 2008.
- I. IEC 61347-2-3 - Lamp Control Gear - Part 2-3: Particular Requirements for A.C. and/or D.C. Supplied Electronic Control Gear for Fluorescent Lamps; 2011, with Amendments, 2016.
- J. IEEE 1789 - Recommended Practice for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers; 2015.
- K. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).
- L. ISO 9001 - Quality Management Systems-Requirements; 2008.
- M. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- N. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; 2010.
- O. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; National Electrical Manufacturers Association; 2015.
- P. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2015).
- Q. NFPA 70 - National Electrical Code; National Fire Protection Association; *Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.*
- R. UL 20 - General-Use Snap Switches; *Current Edition, Including All Revisions.*
- S. UL 508 - Industrial Control Equipment; Underwriters Laboratories Inc.; *Current Edition, Including All Revisions.*
- T. UL 924 - Emergency Lighting and Power Equipment; *Current Edition, Including All Revisions.*
- U. UL 935 - Fluorescent-Lamp Ballasts; *Current Edition, Including All Revisions.*
- V. UL 1310 – Class 2 Power Units; *Current Edition, Including All Revisions.*
- W. UL 1472 - Solid-State Dimming Controls; *Current Edition, Including All Revisions.*
- X. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits; *Current Edition, Including All Revisions.*
- Y. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; *Current Edition, Including All Revisions.*
- Z. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; *Current Edition, Including All Revisions.*

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. Coordinate the placement of sensors and wall controls with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate the placement of wall controls with actual installed door swings.

3. Coordinate the placement of daylight sensors with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
 4. Coordinate the work to provide luminaires and lamps compatible with the lighting controls to be installed.
 5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- B. Pre-Wire Meeting: *Lutron LSC-PREWIRE*: Include additional costs for Lighting Control Manufacturer to conduct on-site meeting prior to commencing work. Manufacturer to review with installer:
1. Low voltage wiring requirements.
 2. Separation of power and low voltage/data wiring.
 3. Wire labeling.
 4. Wireless hub locations and installation.
 5. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", sensor locations to be reviewed in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.
 6. Control locations.
 7. Computer jack locations.
 8. Load circuit wiring.
 9. Network wiring requirements.
 10. Connections to other equipment.
 11. Installer responsibilities.
- C. Sequencing
1. Do not install sensors and wall controls until final surface finishes and painting are complete.
- 1.5 SUBMITTALS
- A. See Division 01 - *Administrative Requirements* for submittal procedures.
- B. Design Documents: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide plans indicating occupancy/vacancy and/or daylight sensor locations.
- C. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
1. Occupancy/Vacancy Sensors: Include detailed basic motion detection coverage range diagrams.

2. Wall Dimmers: Include derating information for ganged multiple devices.
 - D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
 - E. System Performance-Verification Documentation; *Lutron LSC-SPV-DOC*: Include additional costs for manufacturer's enhanced documentation detailing start-up performance-verification procedures and functional tests performed along with test results.
 - F. Title 24 Acceptance Testing Documentation: Submit Certification of Acceptance and associated documentation for lighting control acceptance testing performed in accordance with CAL TITLE 24 P6, as specified in Part 3 under "COMMISSIONING".
 - G. Project Record Documents: Record actual installed locations and settings for lighting control system components.
 - H. Operation and Maintenance Data: Include detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
 - I. Warranty: Submit sample of manufacturer's Warranty or Enhanced Warranty as specified in Part 1 under "WARRANTY". Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- 1.6 QUALITY ASSURANCE
- A. Conform to requirements of NFPA 70.
 - B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
 - C. Manufacturer Qualifications:
 1. Company with not less than ten years of experience manufacturing lighting control products using wireless communication between devices.
 2. Registered to ISO 9001, including in-house engineering for product design activities.
 3. Provides factory direct technical support hotline available 24 hours per day, 7 days per week.
 4. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.
- 1.7 DELIVERY, STORAGE AND HANDLING
- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.8 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.
 - 1. Basis of Design System Requirements - *Lutron*, Unless Otherwise Indicated:
 - a. Ambient Temperature:
 - 1. Lighting Control System Components, Except Fluorescent Electronic Dimming Ballasts: Between 32 and 104 degrees F (0 and 40 degrees C).
 - 2. Fluorescent Electronic Dimming Ballasts: Between 50 and 140 degrees F (10 and 60 degrees C).
 - b. Relative Humidity: Less than 90 percent, non-condensing.
 - c. Protect lighting controls from dust.

1.9 WARRANTY

- A. See Division 01 - *Closeout Submittals*, for additional warranty requirements.
- B. Manufacturer's Standard Warranty, With Manufacturer Full-Scope Start-Up; *Lutron Standard 2-Year Warranty; Lutron LSC-B2*:
 - 1. Manufacturer Lighting Control System Components, Except Lighting Management System Computer, Ballasts/Drivers and Ballast Modules:
 - a. First Two Years:
 - i. 100 percent replacement parts coverage, 100 percent manufacturer labor coverage to troubleshoot and diagnose a lighting issue.
 - ii. First-available on-site or remote response time.
 - iii. Remote diagnostics for applicable systems.
 - b. Telephone Technical Support: Available 24 hours per day, 7 days per week, excluding manufacturer holidays.
 - 2. Lighting Management System Computer: One year 100 percent parts coverage, one year 100 percent manufacturer labor coverage.
 - 3. Ballasts/Drivers and Ballast Modules:
 - a. With Remote Full-Scope Start-Up: Three years 100 percent parts coverage, no manufacturer labor coverage.
 - b. With On-Site Full-Scope Start-Up: Five years 100 percent parts coverage, no manufacturer labor coverage.
- C. Include additional costs for manufacturer's enhanced warranty; *Silver Enhanced Warranty; Lutron LSC-E8S*:
 - 1. Manufacturer Lighting Control System Components, Except Lighting Management System Computer, Ballasts/Drivers and Ballast Modules:
 - a. First Two Years:
 - i. 100 percent replacement parts coverage, 100 percent manufacturer labor coverage to troubleshoot and diagnose a lighting issue.
 - ii. Remote diagnostics for applicable systems.

- iii. As-available Field Service response; no committed response time.
- b. Telephone Technical Support: Available 24 hours per day, 7 days per week, excluding manufacturer holidays.
- c. Additional Coverage for Years 3-5: 50 percent replacement parts coverage, no manufacturer labor coverage.
- d. Additional Coverage for Years 6-8: 25 percent replacement parts coverage, no manufacturer labor coverage.
- 2. Lighting Management System Computer: One year 100 percent parts coverage, one year 100 percent manufacturer labor coverage.
- 3. Ballasts/Drivers and Ballast Modules:
 - a. With Remote Full-Scope Start-Up or no Full-Scope Start-Up: Three years 100 percent parts coverage, no manufacturer labor coverage.
 - b. With On-Site Full-Scope Start-Up: Five years 100 percent parts coverage, no manufacturer labor coverage.
- 4. Lighting Management System Computer: One year 100 percent parts coverage, one year 100 percent manufacturer labor coverage.
- 5. Ballasts/Drivers and Ballast Modules:
 - a. With Remote Full-Scope Start-Up or no Full-Scope Start-Up: Three years 100 percent parts coverage, no manufacturer labor coverage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer: *Lutron Electronics Company, Inc; Vive; www.lutron.com.*
- B. Approved equal

2.2 LIGHTING CONTROLS - GENERAL REQUIREMENTS

- A. Sensor Layout and Tuning: Include Lighting Control Manufacturer's Sensor Layout and Tuning service; *Lutron LSC-SENS-LT*:
 - 1. Lighting Control Manufacturer to take full responsibility for wired or wireless occupancy/vacancy and daylight sensor layout and performance for sensors provided by Lighting Control Manufacturer.
 - 2. Lighting Control Manufacturer to analyze the reflected ceiling plans, via supplied electronic AutoCAD format, and design a detailed sensor layout that provides adequate occupancy sensor coverage and ensures occupancy and daylight sensor performance per agreed upon sequence of operations. Contractor to utilize the layouts for sensor placement.
 - 3. During startup, Lighting Control Manufacturer to direct Contractor regarding sensor relocation, as required, should conditions require a deviation from locations specified in the drawings.
 - 4. Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits, within one calendar year from Date of Substantial Completion to fine-tune sensor calibration per the agreed upon sequence of operations.

- B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.
- C. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, programming, etc. as necessary for a complete operating system that provides the control intent indicated.
- D. Design lighting control equipment for 10 year operational life while operating continually at any temperature in an ambient temperature range of 32 degrees F (0 degrees C) to 104 degrees F (40 degrees C) and 90 percent non-condensing relative humidity.
- E. Electrostatic Discharge Tolerance: Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.
- F. Power Failure Recovery: When power is interrupted for periods and subsequently restored, lights to automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.
- G. Wireless Devices:
 - 1. Wireless device family includes area or fixture level sensors, area or fixture level load controls for dimming or switching, and load controls that can be mounted in a wallbox, on a junction box, or at the fixture.
 - 2. Wireless devices including sensors, load controls, and wireless remotes or wall stations, can be set up using simple button press programming without needing any other equipment (e.g. central hub, processor, computer, or other smart device).
 - 3. Wireless hub adds the ability to set up the system using any smart device with a web browser (e.g. smartphone, tablet, PC, or laptop).
 - 4. System does not require a factory technician to set up or program the system.
 - 5. Capable of diagnosing system communications.
 - 6. Capable of having addresses automatically assigned to them.
 - 7. Receives signals from other wireless devices and provides feedback to user.
 - 8. Capable of determining which devices have been addressed.
 - 9. RF Range: 60 feet (18 m) line-of-sight or 30 feet (9 m) through typical construction materials between RF transmitting devices and compatible RF receiving devices.
 - 10. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of CFR, Title 47, Part 15, for Class B application.
- H. Wireless Network:
 - 1. RF Frequency: 434 MHz; operate in FCC governed frequency spectrum for periodic operation; continuous transmission spectrum is not permitted.
 - a. Wireless sensors, wireless wall stations and wireless load control devices do not operate in the noisy 2.4 GHz frequency band where high potential for RF interference exists.

- b. Wireless devices operate in an uncongested frequency band providing reliable operation.
 - c. Fixed network architecture ensures all associated lights and load controls respond in a simultaneous and coordinated fashion from a button press, sensor signal, or command from the wireless hub (i.e. no popcorning).
 2. Distributed Architecture: Local room devices communicate directly with each other. If the wireless hub is removed or damaged, local control, sensing, and operation continues to function without interruption.
 3. Local room devices communicate directly with each other (and not through a central hub or processor) to ensure:
 - a. Reliability of system performance.
 - b. Fast response time to events in the space (e.g. button presses or sensor signals).
 - c. Independent operation in the event of the wireless hub being removed or damaged.
 - I. Device Finishes:
 1. Wall Controls: Match finishes for Wiring Devices in Section 26 04 00, unless otherwise indicated.
 2. Standard Colors: Comply with NEMA WD1 where applicable.
 3. Color Variation in Same Product Family: Maximum delta E of 1, CIE L*a*b color units.
 4. Visible Parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.
 - J. Interface with building automation system; *Lutron System and Network Integration Consultation; LSC-INT-VISIT.*

2.3 WIRELESS SENSORS

A. General Requirements:

1. Operational life of 10 years without the need to replace batteries when installed per manufacturer's instructions.
2. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
3. Does not require external power packs, power wiring, or communication wiring.
4. Capable of being placed in test mode to verify correct operation from the face of the unit.

B. Wireless Occupancy/Vacancy Sensors:

1. General Requirements:

- a. Provides a clearly visible method of indication to verify that motion is being detected during testing and that the unit is communicating to compatible RF receiving devices.
- b. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.

- c. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions; *Lutron XCT Technology*. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
 - d. Provide optional, readily accessible, user-adjustable controls for timeout, automatic/manual-on, and sensitivity.
 - e. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 5, 15, and 30 minutes.
 - f. Capable of turning dimmer's lighting load on to an optional locked preset level selectable by the user. Locked preset range to be selectable on the dimmer from 1 percent to 100 percent.
 - g. Color: White.
 - h. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
 - i. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free removal.
 - j. Sensor lens to illuminate during test mode when motion is detected to allow installer to place sensor in ideal location and to verify coverage prior to permanent mounting.
 - k. Ceiling-Mounted Sensors:
 - 1. Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
 - 2. Provide recessed mounting bracket compatible with drywall and compressed fiber ceilings.
 - l. Wall-Mounted Sensors: Provide wall or corner mounting brackets compatible with drywall and plaster walls.
2. Wireless Combination Occupancy/Vacancy Sensors:
- a. Ceiling-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), an occupancy sensor with low light feature (automatic-on when less than one foot-candle of ambient light available and automatic-off), or a vacancy sensor (manual-on and automatic-off).
 - b. Wall-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), or a vacancy sensor (manual-on and automatic-off).
 - c. Product(s):
 - 1. Ceiling-Mounted Occupancy/Vacancy Sensor; Lutron Radio Pow Savr Series, Model LFR2-OCR2B-P-WH; or Lutron Radio Pow Savr Series, Model ULFR2-OCR2B-P-WH (BAA-Buy American Act Compliant)>>: Coverage from 324 square feet (30.2 sq m) to 676 square feet (62.4 sq m) depending on ceiling height from 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.
 - 2. Wall-Mounted Occupancy/Vacancy Sensor; Lutron Radio Pow Savr Series, Model LFR2-OWLB-P-WH; or Lutron Radio Pow Savr

- Series, Model ULFR2-OWLB-P-WH (BAA-Buy American Act Compliant)>>: Minor motion coverage of 1500 square feet (139.4 sq m) and major motion coverage of 3000 square feet (278.7 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 180 degree field of view.
3. Corner-Mounted Occupancy/Vacancy Sensor; Lutron Radio Pow Savr Series, Model LFR2-OKLB-P-WH; or Lutron Radio Pow Savr Series, Model ULFR2-OKLB-P-WH (BAA-Buy American Act Compliant)>>: Minor motion coverage of 1225 square feet (113.8 sq m) and major motion coverage of 2500 square feet (232.3 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 90 degree field of view.
3. Wireless Vacancy-Only Sensors:
- a. Operates only as a vacancy sensor (manual-on and automatic-off)
 - b. Product(s):
 1. Ceiling-Mounted Vacancy-Only Sensors Lutron Radio Pow Savr Series, Model LFR2-VCR2B-P-WH; or Lutron Radio Pow Savr Series, Model ULFR2-VCR2B-P-WH (BAA-Buy American Act Compliant) Coverage from 324 square feet (30.2 sq m) to 676 square feet (62.4 sq m) depending on ceiling height from 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.
 2. Wall-Mounted Vacancy-Only Sensor; Lutron Radio Pow Savr Series, Model LFR2-VWLB-P-WH; or Lutron Radio Pow Savr Series, Model ULFR2-VWLB-P-WH (BAA-Buy American Act Compliant) Minor motion coverage of 1500 square feet (139.4 sq m) and major motion coverage of 3000 square feet (278.7 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 180 degree field of view.
- C. Wireless Daylight Sensors:
1. Product: *Lutron Radio Pow Savr Series, Model LFR2-DCRB-WH.*
 2. Open-loop basis for daylight sensor control scheme.
 3. Stable output over temperature from 32 degrees F (0 degrees C) to 104 degrees F (40 degrees C).
 4. Partially shielded for accurate detection of available daylight to prevent fixture lighting and horizontal light component from skewing sensor detection.
 5. Provide linear response from 2 to 150 foot-candles.
 6. Color: White.
 7. Mounting:
 - a. Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
 - b. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
 - c. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free removal.
 8. Meets CAL TITLE 24 P6 requirements.

2.4 LOAD CONTROL MODULES

- A. Provide wireless load control modules as indicated or as required to control the loads as indicated.
- B. Junction Box-Mounted Modules:
1. Plenum rated.
 2. 0-10 V Dimming Modules:
 - a. Product(s):
 - i. 8 A dimming module with 0-10V control, without emergency lighting mode; Lutron PowPak Dimming Module Model RMJS-8T-DV-B; or Lutron PowPak Dimming Module Model URMJS-8T-DV-B (BAA-Buy American Act Compliant)
 - ii. 8 A dimming module with 0-10V control, with emergency lighting mode; Lutron PowPak Dimming Module Model RMJS-8T-DV-B-EM.
 - b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
 - c. Single low voltage dimming module with Class 1 or Class 2 isolated 0-10V output signal conforming to IEC 60929 Annex E.2; source or sink automatically configures.
 - d. Selectable minimum light level.
 - e. Configurable high- and low-end trim.
 - f. Relay: Rated for 0-10 V ballasts, LED drivers, or fixtures that conform with NEMA 410.
 - g. Dimming Modules with Emergency Lighting Mode:
 - i. Operation With *Lutron Vive* Wireless Hub: Upon loss of power, dimming module enters and remains in emergency lighting mode as long as wireless hub is de-energized; upon restoration of power to wireless hub, dimming module returns to normal mode and lights automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.
 - ii. Operation Without *Lutron Vive* Wireless Hub: Upon loss of power, dimming module enters and remains in emergency lighting mode for 90 minutes, during which time local unit buttons and wireless controls are disabled.
 - iii. UL 924 listed.
 3. Digital Ballast/LED Driver Dimming Modules:
 - a. Product: *Lutron PowPak Single Zone Control Module with EcoSystem; Model RMJS-ECO32-SZ.*
 - b. Single dimming module with Class 1 or Class 2 isolated digital output signal conforming to IEC 60929; capable of direct control without interface.
 - c. Provides direct low-voltage control of up to 32 compatible Lutron EcoSystem and third party DALI digital ballasts/LED drivers as a single zone (multiple ballasts/LED drivers connected to same module will be at same light level).

- i. Electronically links a digital ballast/LED driver to a zone for both dimming and turning on/off.
- ii. Electronically assigns occupancy/vacancy sensors for manual on/auto off and auto on/auto off control.
- iii. Electronically assigns wireless control stations for manual local control.
- iv. Electronically assigns daylight sensor for automatic daylight dimming.
- d. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
- e. Selectable minimum light level.
- f. Configurable high- and low-end trim.
- 4. Relay Modules:
 - a. Product(s):
 - i. 16 A relay module, without emergency lighting mode, without contact closure output; Lutron PowPak Relay Module Model RMJS-16R-DV-B; or Lutron PowPak Relay Module Model URMJS-16R-DV-B (BAA-Buy American Act Compliant)>>.
 - ii. 16 A relay module, with emergency lighting mode, without contact closure output; Lutron PowPak Relay Module Model RMJS-16R-DV-B-EM.
 - iii. 16 A relay module, without emergency lighting mode, with contact closure output; Lutron PowPak Relay Module Model RMJS-16RCCO1-DV-B; or Lutron PowPak Relay Module Model URMJS-16RCCO1-DV-B (BAA-Buy American Act Compliant).
 - iv. 5 A relay module, without emergency lighting mode, without contact closure output; *Lutron PowPak Relay Module Model RMJS-5R-DV-B.*
 - v. 5 A relay module, without emergency lighting mode, with contact closure output; *Lutron PowPak Relay Module Model RMJS-5RCCO1-DV-B.*
 - b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
 - c. Relay:
 - i. Rated Life of Relay: Typical of 1,000,000 cycles at fully rated 16 A for all lighting loads.
 - ii. Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits.
 - iii. Fully rated output continuous duty for inductive, capacitive, and resistive loads.
 - d. Contact Closure Output:
 - i. Single contact closure output with normally open and normally closed dry maintained contacts suitable for connection to third party equipment (e.g. building management system, HVAC system, etc.).
 - ii. Contact Ratings: Resistive load; 1 A at 0-24 VDC, 0.5 A at 0-24 VAC.

- iii. Controlled by associated occupancy/vacancy sensors and wall controls.
- e. Relay Modules With Emergency Lighting Mode:
 - i. Operation With *Lutron Vive* Wireless Hub: Upon loss of power, relay module enters and remains in emergency lighting mode as long as wireless hub is de-energized; upon restoration of power to wireless hub, relay module returns to normal mode and lights automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.
 - ii. Operation Without *Lutron Vive* Wireless Hub: Upon loss of power, relay module enters and remains in emergency lighting mode for 90 minutes, during which time local unit buttons and wireless controls are disabled.
 - iii. UL 924 listed.
- 5. 20 A Receptacle Modules:
 - a. Product(s):
 - i. 20 A receptacle module, without contact closure output; *Lutron PowPak 20 A Relay Module Model RMJS-20R-DV-B*.
 - ii. 20 A receptacle module, with contact closure output; *Lutron PowPak 20 A Relay Module Model RMJS-20RCCO1-DV-B*.
 - b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, and ten wireless control stations.
 - c. Relay:
 - i. Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits.
 - ii. Motor rating of 1 HP at 120 V, 2 HP at 277 V.
 - d. Contact Closure Output:
 - i. Single contact closure output with normally open and normally closed dry maintained contacts suitable for connection to third party equipment (e.g. building management system, HVAC system, etc.).
 - ii. Contact Ratings: Resistive load; 1 A at 0-24 VDC, 0.5 A at 0-24 VAC.
 - iii. Controlled by associated occupancy/vacancy sensors and wall controls.
- 6. Contact Closure Output Modules:
 - a. Product: *Lutron PowPak CCO Module Model RMJS-CCO1-24-B*; or *Lutron PowPak CCO Module Model URMJS-CCO1-24-B* (BAA-Buy American Act Compliant)
 - b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
 - c. Contact Closure Output:
 - i. Single contact closure output with normally open and normally closed dry maintained contacts suitable for connection to third party equipment (e.g. building management system, HVAC system, etc.).
 - ii. Contact Ratings: Resistive load; 1 A at 0-24 VDC, 0.5 A at 0-24 VAC.

- iii. Operation affected by associated occupancy/vacancy sensors and wall controls.

C. Fixture Control Modules/Sensors:

- 1. Fixture Control Modules:
 - a. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
 - b. Communicates via wired input with one combination occupancy/daylight or vacancy/daylight fixture sensor.
 - c. Coordination between Wired and Wireless Sensors:
 - i. Occupancy/Vacancy Sensing: Wired and wireless sensors work in conjunction (occupancy detected by either sensor turns lights on and vacancy detected by both sensors turns lights off).
 - ii. Daylight Sensing: Wireless sensor takes precedence over wired sensor.
 - d. Selectable minimum light level.
 - e. Configurable high- and low-end trim.
 - f. Plenum rated.
 - g. Mounts to fixture or junction box through ½ inch (16 mm) trade size knockout.
 - h. Digital Ballast/LED Driver Fixture Control Modules:
 - i. Product(s):
 - (a) Digital ballast/LED driver fixture control module, without emergency lighting mode; *Lutron PowPak Wireless Fixture Control for EcoSystem ballasts/drivers; Model FCJS-ECO.*
 - (b) Digital ballast/LED driver fixture control module, with emergency lighting mode; *Lutron PowPak Wireless Fixture Control for EcoSystem ballasts/drivers; Model FCJS-ECO-EM.*
 - ii. Supports reporting of energy measurement to wireless hub at accuracy of plus/minus 2 percent or 0.5 W (whichever is higher).
 - iii. Single integral controller with Class 1 or Class 2 isolated digital output signal conforming to IEC 60929; capable of direct control without interface.
 - iv. Provides direct low-voltage control of up to 3 compatible digital ballasts/LED drivers.
 - (a) Electronically links a digital ballast/LED driver to a zone for both dimming and turning on/off.
 - (b) Electronically assigns occupancy/vacancy sensors for manual on/auto off and auto on/auto off control.
 - (c) Electronically assigns wireless control stations for manual local control.
 - (d) Electronically assigns daylight sensor for automatic daylight dimming.
 - v. Fixture Control Modules With Emergency Lighting Mode:
 - (a) Operation With *Lutron Vive* Wireless Hub: Upon loss of power, fixture control module enters and remains in emergency lighting mode as long as wireless hub is de-

- energized; upon restoration of power to wireless hub, fixture control module returns to normal mode and lights automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.
- (b) Operation Without *Lutron Vive* Wireless Hub: Upon loss of power, fixture control module enters and remains in emergency lighting mode for 90 minutes, during which time local unit buttons and wireless controls are disabled.
 - (c) UL 924 listed.
- i. 0-10 V Dimming Fixture Control Modules:
 - i. Product(s):
 - (a) 0-10 V dimming fixture control module, without emergency lighting mode; *Lutron PowPak Wireless Fixture Control for 0-10 V ballasts/drivers; Model FCJS-010.*
 - (b) 0-10 V dimming fixture control module, with emergency lighting mode; *Lutron PowPak Wireless Fixture Control for 0-10 V ballasts/drivers; Model FCJS-010-EM.*
 - ii. Supports reporting of energy measurement to wireless hub at accuracy of plus/minus 2 percent or 0.5 W (whichever is higher).
 - iii. Single low voltage dimming module with Class 1 or Class 2 isolated 0-10V output signal conforming to IEC 60929 Annex E.2; source or sink automatically configures.
 - iv. Provides 0-10 V control for up to 3 ballasts/LED drivers (1 A load at 120-277 V, 6 mA max control current).
 - v. Rated for switching 0-10 V ballasts, LED drivers, or fixtures that conform with NEMA 410.
 - vi. Fixture Control Modules With Emergency Lighting Mode:
 - (a) Operation With *Lutron Vive* Wireless Hub: Upon loss of power, fixture control module enters and remains in emergency lighting mode as long as wireless hub is de-energized; upon restoration of power to wireless hub, fixture control module returns to normal mode and lights automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.
 - (b) Operation Without *Lutron Vive* Wireless Hub: Upon loss of power, fixture control module enters and remains in emergency lighting mode for 90 minutes, during which time local unit buttons and wireless controls are disabled.
 - (c) UL 924 listed.
- 2. Wired Fixture Sensors:
 - a. Product(s):
 - i. Wired occupancy/daylight fixture sensor; *Lutron PowPak Fixture Sensor; Model FC-SENSOR.*
 - ii. Wired vacancy/daylight fixture sensor; *Lutron PowPak Fixture Sensor; Model FC-VSENSOR.*
 - b. Occupancy/Vacancy Sensing:
 - i. Passive infrared coupled with technology for sensing fine motions; *Lutron XCT Technology.* Signal processing technology detects

- fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
- ii. Coverage: 300 square feet (28 sq m) with mounting height of 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.
- iii. Sensor Timeout: 15 minutes.
 - (a) Sensor timeout adjustable via *Lutron Vive* wireless hub when connected to compatible fixture control module.
- c. Daylight Sensing:
 - i. Automatic calibration.
 - ii. Provide linear response to changes in perceived light level.
 - (a) Response adjustable via *Lutron Vive* wireless hub when connected to compatible fixture control module.
 - iii. Closed loop proportional control scheme.
 - iv. Sensor Range: 0 to 150 foot-candles (0 to 1600 lux).
- d. Mounts to fixture or ceiling.

2.5 WIRED RECEPTACLES WITH WIRELESS COMMUNICATION INPUTS

- A. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors and ten wireless control stations.
- B. Relay:
 - 1. Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits.
 - 2. Rated for switching of general purpose loads.
 - 3. Motor rating of 0.5 HP at 120 V for 15 A receptacles, and 1 HP at 120 V for 20 A receptacles.
- C. Finish: As specified by owner
- D. Product(s):
 - 1. Half switched duplex receptacle, 15A, 125V, NEMA 5-15R; *Lutron Wireless Receptacle with Clear Connect Technology; Model CAR2S-15-STR.*
 - 2. Full switched duplex receptacle, 15A, 125V, NEMA 5-15R; *Lutron Wireless Receptacle with Clear Connect Technology; Model CAR2S-15-DTR.*
 - 3. Half switched duplex receptacle, 20A, 125V, NEMA 5-15R; *Lutron Wireless Receptacle with Clear Connect Technology; Model CAR2S-20-STR.*
 - 4. Full switched duplex receptacle, 20A, 125V, NEMA 5-15R; *Lutron Wireless Receptacle with Clear Connect Technology; Model CAR2S-20-DTR.*

2.6 LUMINAIRE COMPONENTS (FACTORY-INSTALLED)

- A. Wireless fixture control components to be factory-installed in luminaires as specified in Section 26 05 75.
- B. Luminaires specified in Section to be provided with factory-installed wireless fixture control components as specified below
- C. Wireless Fixture Control Dongle:
 - 1. Product(s):
 - a. RF only (no integral sensing capability); *Lutron Vive Wireless Fixture Controller; Model DFCSJ-OEM-RF.*

- b. RF with occupancy/vacancy and daylight sensing; *Lutron Vive Wireless Fixture Controller; Model DFCSJ-OEM-OCC.*
 2. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
 3. Selectable minimum light level.
 4. Supports configurable high- and low-end trim.
 5. Plenum rated in accordance with UL 2043.
 6. Mounts to fixture through hole.
 7. Wireless Fixture Control Dongle with Integral Sensing Capabilities:
 - a. Occupancy/Vacancy Sensing:
 - i. Passive infrared coupled with technology for sensing fine motions; *Lutron XCT Technology*. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
 - ii. Coverage: 300 square feet (28 sq m) with mounting height of 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.
 - iii. Sensor Timeout: 15 minutes.
 - (a) Sensor timeout adjustable via *Lutron Vive* wireless hub.
 - b. Daylight Sensing:
 - i. Automatic calibration.
 - ii. Provide linear response to changes in perceived light level.
 - (a) Response adjustable via *Lutron Vive* wireless hub.
 - iii. Closed loop proportional control scheme.
 - iv. Sensor Range: 0 to 150 foot-candles (0 to 1600 lux).
 - c. Coordination between Integral and Wireless Sensors:
 - i. Occupancy/Vacancy Sensing: Integral and wireless sensors work in conjunction (occupancy detected by either sensor turns lights on and vacancy detected by both sensors turns lights off).
 - ii. Daylight Sensing: Wireless sensor takes precedence over integral sensor.
- D. Digital Bus Interface:
1. Product: *Lutron OEM Digital Bus Interface; Model DFC-OEM-DBI.*
 2. Provides power for wireless fixture control dongle and up to four LED drivers (60mA at 17-19 VDC).
 3. DALI compliant.
 4. UL listed.
- 2.7 WIRED WALL DIMMERS AND SWITCHES WITH WIRELESS COMMUNICATION INPUTS
- A. General Requirements:
1. Provide air gap service switch to disconnect power to load for safe lamp replacement, accessible without removing faceplate.
 2. Operates at the rated capacity across the full ambient temperature range including modified capacities for ganged configurations which require removal of fins.
 3. Provide radio frequency interference suppression.

4. Surge Tolerance: Designed and tested to withstand surges of 6,000 V, 200 amps according to IEEE C62.41.2 without impairment to performance.
 5. Dimmers: Provide full range, continuously variable control of light intensity.
 6. Dimmers for Electronic Low Voltage (ELV) Transformers:
 - a. Provide circuitry designed to control the input of electronic (solid-state) low voltage (ELV) transformers. Do not use dimmers that utilize standard phase control.
 - b. Provide resettable overload protection that provides automatic shut-off when dimmer capacity is exceeded. Do not use protection methods that are non-resettable or require device to be removed from outlet box.
 - c. Designed to withstand a short, per UL 1472, between load hot and either neutral or ground without damage to dimmer.
 7. Dimmers for Magnetic Low Voltage (MLV) Transformers:
 - a. Provide circuitry designed to control and provide a symmetrical AC waveform to input of magnetic low voltage transformers per UL 1472.
 - b. Magnetic low voltage transformers to operate below rated current or temperature.
 8. Electronic Switches:
 - a. Listed as complying with UL 20, UL 508, and UL 1472.
- B. Preset Smart Wall Dimmers and Switches with Wireless Communication Inputs; *Lutron Maestro Wireless Series*:
1. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
 2. Dimmer Control: Multi-function tap switch with small, raised rocker for dimmer adjustment.
 - a. Rocker raises/lowers light level, with new level becoming the current preset level.
 - b. Switch single tap raises lights to preset level or fades lights to off.
 - c. Switch double tap raises light to full on level.
 - d. Switch tap and hold slowly fades lights to off over period of 10 seconds.
 - e. LEDs adjacent to tap switch indicate light level when dimmer is on, and function as locator light when dimmer is off.
 3. Switch Control: Switch single tap turns lights on/off.
 4. Dimmer High-End Trim:
 - a. Incandescent Dimmers: Minimum of 92 percent of line voltage.
 - b. Dimmers for Electronic Low Voltage (ELV) Transformers: Minimum of 95 percent of line voltage.
 - c. Dimmers for Magnetic Low Voltage Transformers: Minimum of 92 percent of line voltage.
 5. Product(s) - Preset Smart Dimmers with Wireless Communication Inputs:
 - a. Preset Smart Dimmer; *Lutron Maestro Wireless Series*: Incandescent/halogen (600 W, 120 V), magnetic low voltage (600 VA/450 W, 120 V), dimmable CFL/LED (150 W, 120 V); multi-location capability using companion dimmers (up to nine companion dimmers may be connected); minimum load requirement.
 - i. *Lutron Model MRF2S-6CL*; single pole/multi-location; 120 V.

- b. Preset Smart Dimmer; *Lutron Maestro Wireless Series*: Electronic low voltage (600 W, 120 V); neutral required; multi-location capability using companion dimmers (up to nine companion dimmers may be connected); minimum load requirement.
 - i. *Lutron Model MRF2S-6ELV-120*; single-pole/multi-location; 120 V.
 - c. *Series*: Incandescent (600 W, 120 V), magnetic low voltage (600 VA/450 W, 120 V); neutral required; multi-location capability using companion dimmers (up to nine companion dimmers may be connected); minimum load requirement.
 - i. Lutron Model MRF2S-6ND-120; or Lutron Model UMRF2S-6ND-120 (BAA-Buy American Act Compliant) single-pole/multi-location; 120 V.
 - d. Companion Dimmer: Provides multi-location capability for compatible *Lutron Maestro Wireless Series* dimmers.
 - i. Lutron Model MA-R; or Lutron Model UMA-R (BAA-Buy American Act Compliant); gloss finish; 120 V.
 - ii. *Lutron Model MSC-AD*; satin finish; 120 V.
 - iii. *Lutron Model MA-R-277V*; gloss finish; 277 V.
 - iv. *Lutron Model MSC-AD-277V*; satin finish; 277 V.
6. Product(s) - Electronic Switches with Wireless Communication Inputs:
- a. Electronic Switch; *Lutron Maestro Wireless Series*: 6 A lighting/3 A fan (120 V); neutral required; multi-location capability using companion switches (up to nine companion switches may be connected); minimum load requirement.
 - i. *Lutron Model MRF2S-6ANS*; single-pole/multi-location; 120 V.
 - b. Electronic Switch; *Lutron Maestro Wireless Series*: 8 A lighting/5.8 A fan (120 V); neutral required; multi-location capability using companion switches (up to nine companion switches may be connected); minimum load requirement.
 - i. Lutron Model MRF2S-8ANS-120; or Lutron Model UMRF2S-8ANS-120 (BAA-Buy American Act Compliant)>>; single-pole/multi-location; 120 V.
 - c. Electronic Switch; *Lutron Maestro Wireless Series*: 8 A lighting/3 A fan (120 V); 8 A lighting (277 V); multi-location capability using companion switches (up to nine companion switches may be connected); minimum load requirement.
 - i. Lutron Model MRF2S-8S-DV; or Lutron Model UMRF2S-8S-DV (BAA-Buy American Act Compliant); single-pole/multi-location; 120-277 V.
 - d. Companion Switch: Provides multi-location capability for compatible *Lutron Maestro Wireless Series* electronic switches.
 - i. Lutron Model MA-AS; or Lutron Model UMA-AS (BAA-Buy American Act Compliant); gloss finish; 120 V.
 - ii. *Lutron Model MSC-AS*; satin finish; 120 V.
 - iii. *Lutron Model MA-AS-277V*; gloss finish; 277 V.
 - iv. *Lutron Model MSC-AS-277V*; satin finish; 277 V.

2.8 WIRED WALLBOX OCCUPANCY SENSORS WITH WIRELESS COMMUNICATION INPUTS

- A. 0-10 V Wall Dimmer/Switch Combination Occupancy/Vacancy Sensors with Wireless Communication Inputs; *Lutron Maestro Wireless 0-10 Dimmer Sensor/Maestro Wireless Sensor Switch Series*:
1. Communicates via radio frequency with up to ten compatible wireless occupancy/vacancy sensors, ten wireless control stations, and one wireless daylight sensor.
 2. Compatible with sourcing electronic 0-10 V ballasts/drivers, as per IEC 60929 Annex E.2 0-10 V protocol.
 3. Selectable option to enable low light feature (automatic-on when ambient light is below threshold). Ambient light threshold to be selectable as either adaptive utilizing occupant feedback (Lutron Smart Ambient Light Detection) or as fixed (high, medium, low, and minimum presets).
 4. Occupancy/Vacancy Sensors:
 - a. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
 - b. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions; *Lutron XCT Technology*. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
 - c. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
 - d. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area; adjustable timeout settings (1, 5, 15, or 30 minutes).
 - e. Adjustable sensitivity (high, medium, low, and minimum presets).
 - f. Selectable option to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference rooms and classrooms; when room is vacated, returns to normal automatic-on operation after time delay period.
 - g. Selectable walk-through mode to override selected timeout and automatically turn off lights if no motion is detected within 3 minutes after initial occupancy for applications where space may be briefly occupied.
 5. Vacancy-Only Sensors:
 - a. Operates only as a vacancy sensor (manual-on and automatic-off)
 - b. Adjustable sensitivity (high, medium, low, and minimum presets).
 6. Dimmer Features:
 - a. Adjustable high/low end trims.
 - b. Selectable dimming curve (linear or switched).
 - c. Selectable fade on/fade off times (15, 5, 2.5, or 0.75 sec).
 - d. Adjustable auto-on light level (fully adjustable from one to 100 percent).
 7. Dimmer Control: Multi-function tap switch with small, raised rocker for dimmer adjustment.
 - a. Rocker raises/lowers light level, with new level becoming the current preset level.
 - b. Switch single tap raises lights to preset level or fades lights to off.
 - c. Switch double tap raises light to full on level.

8. Switch Control: Switch single tap turns lights on/off.
9. Product(s):
 - a. Passive Infrared 0-10 V Wall Dimmer Occupancy/Vacancy Sensor; *Lutron Maestro Wireless 0-10 V Dimmer Sensor/Maestro Wireless Sensor Switch Series: 0-10 V control for 0-10 V fluorescent ballasts/LED drivers (8 A load at 120-277 V, 50 mA max control current); coverage of 900 square feet (81 sq m) with mounting height of 4 feet (1.2 m); 180 degree field of view; multi-location capability using Pico wireless control stations with wallbox mounting adapter.*
 - i. Sensor dimmer; occupancy/vacancy; *Lutron Model MRF2S-8SD010.*
 - ii. Sensor dimmer; vacancy-only; *Lutron Model MRF2S-8SDV010.*
 - iii. Sensor switch; occupancy/vacancy; *Lutron Model MRF2S-8SS.*
 - iv. Sensor switch; vacancy-only; *Lutron Model MRF2S-8SSV.*

2.9 WIRELESS CONTROL STATIONS

- A. Product(s):
 1. 2-Button Control; *Lutron Pico Wireless Control Model PJ2-2B; or Lutron Pico Wireless Control Module UPJ2-2B (BAA-Buy American Act Compliant).*
 - a. Button Marking: As indicated on drawings.
 2. Button Control with Night Light; *Lutron Pico Wireless Control Model PJN-2B.*
 3. 2-Button with Raise/Lower Control; *Lutron Pico Wireless Control Model PJ2-2BRL; or Lutron Pico Wireless Control Module UPJ2-2BRL (BAA-Buy American Act Compliant).*
 - a. Button Marking: Light (icons); As indicated on drawings.
 4. 3-Button Control; *Lutron Pico Wireless Control Model PJ2-3B; or Lutron Pico Wireless Control Module UPJ2-3B (BAA-Buy American Act Compliant).*
 - a. Button Marking: As indicated on drawings.
 5. 3-Button with Raise/Lower Control; *Lutron Pico Wireless Control Model PJ2-3BRL; or Lutron Pico Wireless Control Module UPJ2-3BRL (BAA-Buy American Act Compliant).*
 - a. Button Marking: As indicated on drawings.
 6. 3-Button with Raise/Lower Control and Night Light; *Lutron Pico Wireless Control Model PJN-3BRL.*
 7. *Lutron Pico Wireless Control Module UPJ2-4B (BAA-Buy American Act Compliant)>>.*
 - a. Button Marking: Zone controls (light); Scene keypads (light); 2-group controllers (lights); 4-group toggle; As indicated on drawings.
 8. Single Pedestal; *Lutron Pico Pedestal Model L-PED1.*
 9. Double Pedestal; *Lutron Pico Pedestal Model L-PED2.*
 10. Triple Pedestal; *Lutron Pico Pedestal Model L-PED3.*
 11. Quadruple Pedestal; *Lutron Pico Pedestal Model L-PED4.*
 12. Screw Mounting Kit; *Lutron Model PICO-SM-KIT.*
 13. Wallbox Adapter; *Lutron Model PICO-WBX-ADAPT.*
- B. Quantity: As indicated on the drawings.

- C. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
- D. Does not require external power packs, power or communication wiring.
- E. Allows for easy reprogramming without replacing unit.
- F. Button Programming:
 - 1. Single action.
 - 2. Toggle action.
- G. Includes LED to indicate button press or programming mode status.
- H. Mounting:
 - 1. Capable of being mounted with a table stand or directly to a wall under a faceplate.
 - 2. Faceplates: Provide concealed mounting hardware.
- I. Power: Battery-operated with minimum ten-year battery life (3-year battery life for night light models).
- J. Finish: As specified for wall controls.

2.10 LED DRIVERS

- A. General Requirements:
 - 1. Operate for at least 50,000 hours at maximum case temperature and 90 percent non-condensing relative humidity.
 - 2. Provide thermal fold-back protection by automatically reducing power output (dimming) to protect LED driver and LED light engine/fixture from damage due to over-temperature conditions that approach or exceed the LED driver's maximum operating temperature at calibration point.
 - 3. Provide integral recording of operating hours and maximum operating temperature to aid in troubleshooting and warranty claims.
 - 4. Designed and tested to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.
 - 5. Manufactured in a facility that employs ESD reduction practices in compliance with ANSI/ESD S20.20.
 - 6. UL 8750 recognized or listed as applicable.
 - 7. UL Type TL rated or UL Class P listed where possible to allow for easier fixture evaluation and listing of different driver series.
 - 8. Suitable for field replacement as applicable; listed in accordance with UL 1598C or UL 8750, Class P as indicated.
 - 9. Designed and tested to withstand Category A surges of 4,000 V according to IEEE C62.41.2 without impairment of performance.
 - 10. Class A sound rating; Inaudible in a 27 dBA ambient.
 - 11. Demonstrate no visible change in light output with a variation of plus or minus 10 percent change in line-voltage input.

12. LED drivers of the same family/series to track evenly across multiple fixtures at all light levels.
 13. Offer programmable output currents in 10 mA increments within designed driver operating ranges for custom fixture length and lumen output configurations, while meeting a low-end dimming range of 100 to 0.1 percent, 100 to 1 percent or 100 to 5 percent as applicable.
 14. Meet NEMA 410 inrush requirements for mitigating inrush currents with solid state lighting sources.
 15. Employ integral fault protection up to 277 V to prevent LED driver damage or failure in the event of incorrect application of line-voltage to communication link inputs.
 16. LED driver may be remote located up to 100 feet (30 m) from LED light engine depending on power outputs required and wire gauge utilized by installer.
- B. 3-Wire Control:
1. Provide integral fault protection to prevent driver failure in the event of a mis-wire.
 2. Operate from input voltage of 120 V through 277 V at 50/60 Hz.
- C. Digital Control (when used with compatible *Lutron* lighting control systems):
1. Employ power failure memory; LED driver to automatically return to the previous state/light level upon restoration of utility power.
 2. Operate from input voltage of 120 V through 277 V at 50/60 Hz.
 3. Automatically go to 100 percent light output upon loss of control link voltage and lock out system commands until digital control link voltage is restored. Manufacturer to offer UL 924 compliance achievable through use of external *Lutron Model LUT-ELI-3PSH* interface upon request.
 4. When normal power is lost, drivers fed with emergency power go to emergency mode.
 5. Replacement of single driver during maintenance does not require reprogramming.
 6. Digital low-voltage control wiring capable of being wired as either Class 1 or Class 2.
- D. Product(s):
1. Digital Control, 0.1 Percent Dimming with Soft-On and Fade-to-Black Low End Performance; *Lutron Hi-lume Premier 0.1% Constant Voltage (L3D0-Series)*:
 - a. Dimming Range: 100 to 0.1 percent measured output current.
 - b. Features smooth fade-to-on and fade-to-black (*Lutron Soft-On, Fade-to-Black™*) low end dimming performance for an incandescent-like dimming experience.
 - c. Typically dissipates 0.25 W standby power at 120 V and 0.40 W standby power at 277 V.
 - d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V and residential applications at 120 V.
 - e. Total Harmonic Distortion (THD): Less than 20 percent at maximum power; complies with ANSI C82.11.

- f. Class 2 output designed to withstand hot swap of LED loads; meets UL 1310 and CSA C22.2 No. 223.
- g. Driver outputs to be short circuit protected, open circuit protected, and overload protected.
- h. Constant Voltage Drivers:
 - 1. Support for cove and under-cabinet fixtures at 24 V.
 - i. Support LED arrays from 2 W to 96 W.
 - ii. Pulse Width Modulation (PWM) dimming frequency meets IEEE 1789.
 - iii. Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
 - iv. UL listed.
 - 2. 3-Wire Control, 0.1 Percent Dimming; *Lutron Hi-lume Premier 0.1% Constant Voltage (L3D0-Series)*:
 - a. Dimming Range: 100 to 0.1 percent measured output current.
 - b. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V and residential applications at 120 V.
 - c. Total Harmonic Distortion (THD): Less than 20 percent at maximum power; complies with ANSI C82.11.
 - d. UL Class 2 output designed to withstand hot swap of LED loads.
 - e. Driver outputs to be short circuit protected, open circuit protected, and overload protected.
 - f. Constant Voltage Drivers:
 - 1. Support for cove and under-cabinet fixtures at 24 V.
 - i. Support LED arrays from 2 W to 96 W.
 - ii. Pulse Width Modulation (PWM) dimming frequency meets IEEE 1789.
 - iii. Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
 - iv. UL listed.
 - 3. Digital Control, 0.1 Percent Dimming with Soft-On and Fade-to-Black Low End Performance; *Lutron Hi-lume Premier 0.1% Constant Current (PEQ0-Series)*:
 - a. Dimming Range: 100 to 0.1 percent measured output current.
 - b. Features smooth fade-to-on and fade-to-black (*Lutron Soft-On, Fade-to-Black™*) low end dimming performance for an incandescent-like dimming experience.
 - c. Typically dissipates less than 0.5 W standby power at 120/277 V.
 - d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120/277 V.
 - e. Class 2 output designed to withstand hot swap of LED loads; meets UL 1310 and CSA C22.2 No. 223.
 - f. Driver outputs to be short circuit protected and open circuit protected.

- g. Constant Current Drivers:
 - 1. Support for downlights and pendant fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 20 W.
 - ii. Constant Current Reduction (CCR) dimming method.
 - iii. UL listed Class P.
 - iv. Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
 - 2. Support for troffers, linear pendants, and linear recessed fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 20 W.
 - ii. Constant Current Reduction (CCR) dimming method.
 - iii. UL listed Class P.
 - iv. Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
- 4. Digital Control, 1 Percent Dimming with Soft-On and Fade-to-Black Low End Performance; *Lutron Hi-lume Premier 1% Constant Current (PEQ1-Series)*:
 - a. Dimming Range: 100 to 1 percent measured output current.
 - b. Features smooth fade-to-on and fade-to-black (*Lutron Soft-On, Fade-to-Black™*) low end dimming performance for an incandescent-like dimming experience.
 - c. Typically dissipates less than 0.5 W standby power at 120/277 V.
 - d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120/277 V.
 - e. Class 2 output designed to withstand hot swap of LED loads; meets UL 1310 and CSA C22.2 No. 223.
 - f. Driver outputs to be short circuit protected and open circuit protected.
 - g. Constant Current Drivers:
 - 1. Support for downlights and pendant fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 20 W.
 - ii. Constant Current Reduction (CCR) dimming method.
 - iii. UL listed Class P.
 - iv. Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
 - 2. Support for troffers, linear pendants, and linear recessed fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 20 W.
 - ii. Constant Current Reduction (CCR) dimming method.
 - iii. UL listed Class P.
 - iv. Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
- 5. Forward Phase (Neutral Wire Required), One Percent Dimming; *Lutron Hi-lume 1% (LTE-Series)*:
 - a. Dimming Range: 100 to one percent relative light output.

- b. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial and residential applications at 120 V.
- c. Total Harmonic Distortion (THD): Less than 20 percent at full output for 40 W loads; complies with ANSI C82.11.
- d. Constant Current Drivers:
 - 1. Support for downlights and pendant fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 53 W.
 - ii. Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
 - iii. UL listed Class P.
 - iv. Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
 - 2. Support for troffers, linear pendants, and linear recessed fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.
 - ii. Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
 - iii. UL listed Class P.
 - iv. Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
 - 3. Support for cove and under-cabinet fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.
 - ii. Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
 - iii. UL listed.
 - iv. Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
- e. Constant Voltage Drivers:
 - 1. Support for downlights and pendant fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.
 - ii. Pulse Width Modulation (PWM) dimming method.
 - iii. UL listed Class P.
 - iv. Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
 - 2. Support for troffers, linear pendants, and linear recessed fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.
 - ii. Pulse Width Modulation (PWM) dimming method.
 - iii. UL listed Class P.

- iv. Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
 3. Support for cove and under-cabinet fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.
 - ii. Pulse Width Modulation (PWM) dimming method.
 - iii. UL listed.
 - iv. Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
6. 3-Wire and Digital Control, One Percent Dimming; *Lutron Hi-lume 1% (L3D-Series)*:
 - a. Dimming Range: 100 to one percent relative light output.
 - b. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120 V or 277 V.
 - c. Total Harmonic Distortion (THD): Less than 20 percent at full output for loads greater than 25 W typical (higher for select models); complies with ANSI C82.11.
 - d. Constant Current Drivers:
 1. Support for downlights and pendant fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 53 W.
 - ii. Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
 2. Support for troffers, linear pendants, and linear recessed fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.
 - ii. Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
 3. Support for cove and under-cabinet fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.
 - ii. Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
 - iii. UL listed.
 - e. Constant Voltage Drivers:
 1. Support for downlights and pendant fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.
 - ii. Pulse Width Modulation (PWM) dimming method.
 2. Support for troffers, linear pendants, and linear recessed fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.
 - ii. Pulse Width Modulation (PWM) dimming method.
 3. Support for cove and under-cabinet fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.

- ii. Pulse Width Modulation (PWM) dimming method.
 - iii. UL listed.
- 7. Digital Control, Five Percent Dimming; *Lutron 5-Series (LDE5-Series)*:
 - a. Dimming Range: 100 to five percent measured output current.
 - b. Typically dissipates 0.2 W standby power at 120 V and 0.3 W standby power at 277 V.
 - c. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V.
 - d. Constant Current Reduction (CCR) dimming method.
 - e. Total Harmonic Distortion (THD): Less than 21 percent at full load; complies with ANSI C82.11.
 - f. Constant Current Drivers:
 - 1. Lutron K-Case Form Factor: Support for downlights and pendant fixtures in currents from 220 mA to 1.4 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 40 W.
 - ii. UL listed Class P.
 - 2. Lutron M-Case Form Factor: Support for troffers, linear pendants, and linear recessed fixtures from 150 mA to 2.1 A to ensure a compatible driver exists.
 - i. Support LED arrays up to 75 W.
 - ii. Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in ENERGY STAR for Luminaires Version 2.0.
 - iii. Models available to meet the DesignLights Consortium (DLC) power line quality requirements.
 - iv. UL listed Class P.
- 8. Digital Control, One Percent Dimming with Soft-On and Fade-to-Black Low End Performance; *Lutron Hi-lume 1% Soft-on Fade-to-Black (LDE1-Series)*:
 - a. Dimming Range: 100 to one percent measured output current.
 - b. Features smooth fade-to-on and fade-to-black (*Lutron Soft-On, Fade-to-Black™*) low end dimming performance for an incandescent-like dimming experience.
 - c. Typically dissipates 0.2 W standby power at 120 V and 0.3 W standby power at 277 V.
 - d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V.
 - e. Employs true Constant Current Reduction (CCR) dimming method from 100 to five percent light level and Pulse Width Modulation (PWM) dimming method from five percent to off.
 - f. Pulse Width Modulation (PWM) frequency of 240 Hz.
 - g. Total Harmonic Distortion (THD): Less than 20 percent at full output for drivers greater than 25 W; complies with ANSI C82.11.
 - h. UL Class 2 output.
 - i. Driver outputs to be short circuit protected, open circuit protected, and overload protected.

- j. Constant Current Drivers:
 - 1. Lutron K-Case Form Factor: Support for fixtures from 220 mA to 1.4 A over multiple operating ranges.
 - i. Support LED arrays up to 40 W.
 - ii. Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in ENERGY STAR for Luminaires Version 2.0.
 - iii. UL listed Class P.
 - 2. Lutron M-Case Form Factor: Support for fixtures from 150 mA to 2.1 A over multiple operating ranges.
 - i. Support LED arrays up to 75 W.
 - ii. Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in ENERGY STAR for Luminaires Version 2.0.
 - iii. Models available to meet the DesignLights Consortium (DLC) power line quality requirements.
 - iv. UL listed Class P.

2.11 POWER INTERFACES

- A. Provide power interfaces as indicated or as required to control the loads as indicated.
- B. General Requirements:
 - 1. Phase independent of control input.
 - 2. Dimmer to meet limited short circuit test as defined in UL 508.
 - 3. Utilize air gap off to disconnect the load from line supply.
 - 4. Diagnostics and Service: Replacing power interface does not require re-programming of system or processor.
- C. Product(s):
 - 1. Phase-Adaptive Power Module; *Lutron PHPM-PA*: Provides interface for phase control input to provide full 16 A circuit output of forward/reverse phase control for compatible loads.
 - 2. 3-Wire Fluorescent Power Module; *Lutron PHPM-3F*: Provides interface for phase control input to provide full 16 A circuit output for compatible line-voltage control fluorescent electronic dimming ballasts or LED drivers.
 - 3. Switching Power Module; *Lutron PHPM-SW*: Provides interface for phase control or switched input to provide full 16 A circuit output of switching for compatible non-dim loads.
 - 4. Ten Volt Interface; *Lutron GRX-TVI*: Provides interface for phase control input to provide full 16 A circuit output of switching and 0-10 V low voltage control for compatible fluorescent electronic dimming ballasts or LED drivers.

2.12 DIGITAL DIMMING BALLAST MODULES

- A. Provide digital dimming ballast modules as indicated or as required to control the loads as indicated.

B. General Requirements:

1. Provide continuous 3-wire signal dimming to compatible 3-wire electronic dimming ballasts.
2. Utilize air gap off to disconnect the load from line supply.
3. If power is interrupted and subsequently restored, lights automatically return to the setting prior to power interruption.
4. Unique internal reference number visible displayed on module cover.
5. Dimmer to meet limited short circuit test as defined in UL 20.
6. Provide integral fault protection to prevent ballast module failure in the event of a mis-wire.

C. Product(s):

1. 3-Wire Ballast Module, 16 Amp; *Lutron EcoSystem Model C5-BMJ-16A*:
 - a. Integrates up to 16 amps of 3-wire electronic dimming ballasts into *EcoSystem* digital control system as a single zone.
 - b. Integrates up to 16 amps of switched high intensity discharge (HID) lighting load into *EcoSystem* digital control system as a single zone.

2.13 WIRELESS HUBS

A. Product(s):

1. Wireless hub without BACnet; *Lutron Vive Hub*.
 - a. Flush-mount wireless hub; *Model HJS-0-FM*; supports up to 70 total paired devices.
 - b. Flush-mount wireless hub; *Model HJS-1-FM*; supports up to 700 total paired devices.
 - c. Surface-mount wireless hub; *Model HJS-1-SM*; supports up to 700 total paired devices.

B. Integrated multicolor LED provides feedback on what mode the hub is in for simple identification and diagnosis.

C. Integrated processor and web server allows hub to set up and operate the system without any external connections to outside processors, servers, or the internet.

D. Utilizes Ethernet connection for:

1. Networking up to 64 hubs together to create a larger system.
2. Integration with Building Management System (BMS) via native BACnet; does not require interface (*Lutron Vive Premium* wireless hub with BACnet only).
3. Remote connectivity capabilities, including maintaining system date/time and receiving periodic firmware updates (requires internet connection).

E. A single hub or network of hubs can operate on either a dedicated lighting control only network or can be integrated with an existing building network as a VLAN.

- F. Communicates directly to compatible *Lutron Vive* RF devices through use *Lutron Clear Connect* radio frequency communications link; does not require communication wiring; RF range of 71 feet (23 m) through walls to cover an area of 15836 square feet (1471 sq m) (device and hub must be on the same floor).
- G. Communicates directly to mobile device (smartphone or tablet) or computer using built-in Wi-Fi, 2.4 GHz 802.11b/g; wireless range of 71 feet (23 m) through walls (device and hub must be on the same floor).
 - 1. Does not require external Wi-Fi router for connecting to the hub.
- H. Allows for system setup, control, and monitoring from mobile device or computer using *Vive* web-based software:
 - 1. Supports paired devices up to maximum number indicated including compatible wireless sensors, wireless control stations, and wireless load devices.
 - 2. Allows for timeclock scheduling of events, both time of day and astronomic (sunrise and sunset).
 - a. Timeclock is integrated into the unit and does not require a constant internet connection.
 - b. Retains time and programming information after a power loss.
 - c. 365-day schedulable timeclock allows for:
 - i. Scheduling of events years in advance.
 - ii. Setting of recurring events with exceptions on holidays.
 - d. Time clock events can be scheduled to:
 - i. Send lights to a desired level and select the fade rate desired to reach that level.
 - ii. Adjust level lights go to when occupied.
 - iii. Adjust level lights go to when unoccupied.
 - iv. Enable/disable occupancy.
 - v. Adjust timeout of sensors (requires *Model FC-SENSOR* wired fixture sensor or *Model DFCSJ-OEM-OCC* wireless fixture control dongle with integral sensing capabilities).
 - vi. Control individual devices, areas, or groups of areas. When connected to *Vive Vue* server, only areas or groups of areas can be controlled with timeclock events.
 - 3. Daylighting:
 - a. Daylighting can be enabled/disabled. Can be used to override the control currently taking place in the space.
 - b. Daylight set point can be adjusted with the software to increase or decrease the electric light level in the room based on the same amount of natural light.
 - 4. Allows for control, monitoring, and adjustment from anywhere in the world (*Lutron Vive* wireless hub internet connection required).
 - 5. Uses RF signal strength detection to find nearby devices for quick association and programming without having to climb ladders.
 - a. Association and setup does not require a factory technician to perform.
 - 6. System using *Lutron Vive* wireless hub(s) can operate with or without connection to the internet.
 - 7. Supports energy reporting.
 - a. Reports measured energy data for *PowPak* fixture control modules at accuracy of plus/minus 2 percent or 0.5 W (whichever is higher).

- b. Reports calculated energy data for *PowPak* junction box mounted modules at accuracy of 10 percent.
 - c. Reports measured energy for *DFCSJ Series* wireless fixture control dongle when paired with driver that supports measured power (measurement accuracy defined by driver specification) or reports calculated power if driver does not have measurement capabilities.
 - 8. Supports automatic demand response for load shedding via:
 - a. Local contact closure without need for separate interface.
 - b. OpenADR® 2.0b compliant utility command.
 - c. BACnet (*Lutron Vive Premium* wireless hub with BACnet only).
 - 9. Wireless hub can be firmware upgraded to provide new software features and system updates.
 - a. Firmware update can be done either locally using a wired Ethernet connection or Wi-Fi connection, or remotely if the wireless hub is connected to the internet.
- I. *Lutron Vive* Web-Based Application:
- 1. Accessibility and Platform Support:
 - a. Web-based; runs on most HTML5 compatible browsers (including Safari and Chrome).
 - b. Supports multiple platforms and devices; runs from a tablet, desktop, laptop, or smartphone.
 - c. User interface supports multi-touch gestures such as pinch to zoom, drag to pan, etc.
 - d. Utilizes HTTPS (industry-standard certificate-based encryption and authentication for security).
 - e. Multi-level Password Protected Access: Individual password protection on both the integrated Wi-Fi network and web-based software.
 - f. WPA2 security for Wi-Fi communication with wireless hub.
 - 2. System Navigation and Status Reporting:
 - a. Area Tree View: Easy navigation by area name to view status and make programming adjustments through the software.
 - b. Area and device names can be changed in real time.
 - 3. Setup app available for iOS and Android that allows for:
 - a. Job registration to extend product warranty.
 - b. Management of setup for multiple projects in different locations.
 - c. Creation of handoff documents that are sent directly to a facility manager via email once setup is complete.
 - d. Backup of *Vive* wireless hub database to *Lutron* cloud for hub replacement.
 - e. Access to native help and instructions to assist user with *Vive* system setup.
- J. BACnet Integration (*Lutron Vive Premium* wireless hub with BACnet only):
- 1. Provide ability to communicate by means of native BACnet IP communication (does not require interface) to lighting control system from a user-supplied 10BASE-T or 100BASE-T Ethernet network.
 - 2. Requires only one network connection per hub.
 - 3. BACnet Integrator Capabilities:
 - a. The BACnet integrator can command:

- i. Area light output.
 - ii. Area load shed level.
 - iii. Area load shed enable/disable.
 - iv. Enable/Disable:
 - (a) Area occupancy sensors.
 - (b) Area daylighting.
 - v. Daylighting level.
 - vi. Area occupied and unoccupied level
 - vii. Occupancy sensor timeouts (for fixture sensors).
 - b. The BACnet integrator can monitor:
 - i. Area on/off status.
 - ii. Area occupancy status.
 - iii. Area load shed status.
 - iv. Area instantaneous energy usage and maximum potential power usage.
 - v. Enable/Disable:
 - (a) Area occupancy sensors.
 - (b) Daylighting.
 - (c) Timeclocks.
 - vi. Daylighting level.
 - vii. Light levels from photo sensors.
 - viii. Area occupied and unoccupied level.
 - ix. Occupancy sensor timeouts.
- K. Contact Closure Interface: Provide two contact closure inputs; accepts both momentary and maintained contact closures that can be used for automatic demand response.
- L. Rated for use in air-handling spaces as defined in UL 2043.
- M. Meets CAL TITLE 24 P6 requirements.
- N. Provide Ethernet switch(es) as required for inter-hub network wiring per manufacturer's instructions; do not exceed manufacturer's required maximum wiring segment lengths.
 - 1. Product(s):
 - a. *Lutron Model ETH-SWITCH-16*; 16 port.
 - b. *Lutron Model ETH-SWITCH-24*; 24 port.
 - c. *Lutron Model ETH-SWITCH-24-1M*; 24 port, 1 multi-mode fiber.
 - d. *Lutron Model ETH-SWITCH-24-2M*; 24 port, 2 multi-mode fiber.
 - e. *Lutron Model ETH-SWITCH-24-1S*; 24 port, 1 single-mode fiber.
 - f. *Lutron Model ETH-SWITCH-24-2S*; 24 port, 2 single-mode fiber.

2.14 SOFTWARE DATA AND ANALYTICS DASHBOARD

A. Control and Monitor Software:

- 1. Product: *Lutron Vive Vue*.

2. General Requirements:
 - a. Web-based; runs on most HTML5 compatible browsers (including Internet Explorer, Chrome, and Safari).
 - b. Supports multiple platforms and devices; runs from a tablet, desktop, laptop, or smartphone; optimized for displays of 1024 by 768 pixels or higher.
 - c. User interface supports multi-touch gestures such as pinch to zoom, drag to pan, etc.
 - d. Utilizes HTTPS (industry-standard certificate-based encryption and authentication for security).
 - e. All functionality listed below must be available via a single application.
3. System Navigation and Status Reporting:
 - a. Performed using graphical floor plan view or a generic system layout.
 - b. Graphical Floor Plan View: Utilizes customized CAD based drawing of the building. Pan and zoom feature allows for easy navigation; dynamically adjusts the details presented based on zoom level.
4. Control of Lights:
 - a. Control and monitor zone/area lights.
 - i. Area lights can be monitored for on/off status from a graphical floor plan or generic system layout.
 - ii. All lights in an area can be turned on/off (dimnable lights can also be dimmed up/down from current level).
5. Occupancy:
 - a. Area occupancy can be monitored.
 - i. Can be monitored graphically if a graphical floor plan has been created.
 - ii. Can be monitored historically in space utilization reports.
 - b. Scheduled events can be created to change occupancy parameters as described under "Scheduling" below.
6. Load Shedding: View current load shed status (active/inactive) for each *Vive* wireless hub and enable/disable load shed for the entire building/system.
7. Scheduling: Schedule time of day and astronomic time clock events to automate functions.
 - a. Scheduled events can control the following:
 - i. Area light levels for all dimmable lights in an area.
 - ii. On/off status of all switched lights and contact-closure outputs in an area.
 - iii. On/off status of all switched receptacles in an area.
 - b. Scheduled events can be created to change the following occupancy parameters:
 - i. Enable/disable sensors.
 - ii. Change occupancy mode (auto-on/auto-off versus manual-on/auto-off).
 - iii. Adjust occupied and/or unoccupied level.
 - iv. For compatible individual fixture sensors, sensor timeout can be adjusted.
 - c. Easily monitor and adjust scheduled events using a weekly calendar view.

8. Reporting: Provide reporting capability that allows the building manager to gather real-time and historical information about the system as follows:
 - a. Energy Reports: Show a comparison of cumulative energy used over a period of time for one or more areas.
 - b. Power Reports: Show power usage trend over a period of time for one or more areas.
 - c. Space Utilization/Occupancy Reports: Show historical occupancy over a period of time for one or more areas using a graphical floor plan, generic system layout, and graphs and charts.
 9. Administration:
 - a. Users: Allows new user accounts to be created and existing user accounts to be edited.
 - i. Supports Active Directory (LDAP) tying user accounts to network accounts.
 - b. Area and feature access can be restricted based on login credentials.
 - c. Supports up to 20 concurrent users and 10,000 user accounts.
 10. Devices/Settings Adjustment:
 - a. Users with appropriate permissions can navigate to the wireless hub setup screens in order to view and/or adjust specific settings for areas or devices (including load shed settings, daylighting settings, device associations and programming, occupancy settings, high-end/low-end trim settings, etc).
 11. Control and Monitor for Multiple *Quantum Vue and/or Vive Vue* Systems; *Lutron Enterprise Vue*:
 - a. Allows user to view aggregate data from multiple connected *Quantum Vue and/or Vive Vue* systems spanning multiple buildings through a single user account:
 - i. Space utilization/occupancy.
 - ii. Energy usage/savings.
 - b. Allows user to view details and adjust settings for any connected *Quantum Vue or Vive Vue* system; supports system navigation through campuses and buildings using graphical floor plans.
- B. Computers:
1. Server:
 - a. Suitable for 24 hour per day, 7 day per week programming, monitoring, control, and data logging of digital-network lighting controls.
 - b. Suitable to handle client machine request in multi-computer systems.
 - c. Minimum Hardware Requirements:
 - i. Processor: Quad Core Intel® Xeon®.
 - ii. 8 GB Ram.
 - iii. 250 GB hard drive (40 GB for application and database).
 - iv. Two 10/100/1000 Ethernet network interfaces - one for communication with lighting management hubs and one for communication with corporate intranet to allow access from system PCs and/or energy saving display terminals. Only one Ethernet network interface is required if all lighting management hubs and client PCs are on the same network.
 - v. Monitor with 1280 x 1024 resolution.
 - vi. 4 USB 2.0 ports.

- vii. Dedicated Graphics Card with 256 MB of memory (only required if running client software from the server).
- d. Minimum Software Requirements:
 - i. Licensed installation of US English 64-bit Microsoft® Windows® Server 2008 R2, Windows Server 2012 R1, or Windows Server 2012 R2.
 - ii. Microsoft® Internet Information Services (IIS) 7 or later.
 - iii. Microsoft® Internet Explorer 9 or later.
 - iv. Microsoft® .NET Framework 3.5.
 - v. Microsoft® .NET Framework 4.5.
- 2. Computers Provided by Lighting Control System Manufacturer: Computer software to be preinstalled and tested prior to shipping.

2.15 SOURCE QUALITY CONTROL

- A. See Division 01 - *Quality Requirements*, for additional requirements.
- B. Factory Testing; *Lutron Standard Factory Testing*:
 - 1. Perform full-function factory testing on all completed assemblies. Statistical sampling is not acceptable.
 - 2. Perform full-function factory testing on 100 percent of all ballasts and LED drivers.
 - 3. Perform factory burn-in of 100 percent of all ballasts at 104 degrees F (40 degrees C).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that ratings and configurations of system components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive system components.
- D. Verify that conditions are satisfactory for installation prior to starting work.

2.2 PREPARATION

- A. System and Network Integration Consultation; *Lutron LSC-INT-VISIT*: Include lighting Control Manufacturer to conduct meeting with facility representative and other related equipment manufacturers to discuss equipment and integration procedures.
 - 1. Coordinate scheduling of visit with Lighting Control Manufacturer. Manufacturer recommends that this visit be scheduled early in construction phase, after system purchase but prior to system installation.

3.3 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130.
- B. Install products in accordance with manufacturer's instructions.
- C. Sensor Locations:
 - 1. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", locate sensors in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, locate sensors in accordance with Drawings.
 - 2. Sensor locations indicated are diagrammatic. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage, in accordance with manufacturer's recommendations.
- D. Ensure that daylight sensor placement minimizes sensor view of electric light sources. Locate ceiling-mounted and luminaire-mounted daylight sensors to avoid direct view of luminaires.
- E. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.
- F. Lamp Lead Lengths: Do not exceed 3 feet (0.9 m) for T4 4-pin compact and T5 BIAX lamps and 7 feet (2.1 m) for T5, T5-HO, T8 U-bend, and T8 linear fluorescent lamps.
- G. LED Light Engine/Array Lead Length: Do not exceed 100 feet (31 m).
- H. Identify system components in accordance with Section 26 0553.

3.4 FIELD QUALITY CONTROL

- A. See Division 01 - *Quality Requirements*, for additional requirements.
- B. Manufacturer's Full-Scope Start-Up Service
- C. Manufacturer's Programming Service:
 - 1. Product(s):
 - a. On-site programming, 8-hour block; *Lutron LSC-OS-PROG8-SP.*
 - b. On-site programming, 4-hour block; *Lutron LSC-OS-PROG4-SP.*
 - c. Remote programming, 4-hour block; *Lutron LSC-RMT-PROG4-SP.*

2. Include costs for manufacturer to perform programming tasks for 8 hours.
3. Furnish unit prices for each available programming time interval.

D. Manufacturer's Full-Scope Start-Up Service:

1. Remote Full-Scope Start-Up Service; *Lutron LSC-RMT-SU-VIVE*: When available in accordance with manufacturer's guidelines, provide access to manufacturer's certified remote startup technician to provide instruction and guidance for complete system functional test.
2. On-Site Full-Scope Start-Up Service; *Lutron LSC-OS-SU-VIVE*: Manufacturer's authorized Service Representative to conduct site visit upon completion of lighting control system installation to perform system startup and verify proper operation:
 - a. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", authorized Service Representative to verify sensor locations, in accordance with layout provided by Lighting Control Manufacturer; Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.
 - b. Verify connection of power wiring and load circuits.
 - c. Verify connection and location of controls.
 - d. Energize wireless hubs.
 - e. Associate occupancy/vacancy sensors, daylight sensors, wireless remotes, and wall stations to load control devices.
 - f. Provide initial rough calibration of sensors; fine-tuning of sensors is responsibility of Contractor unless provided by Lighting Control Manufacturer as part of Sensor Layout and Tuning service where specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS".
 - g. Program timeclock schedules per approved sequence of operations.
 - h. Configure load shed parameters per approved sequence of operations.
 - i. Verify system operation control by control.
 - j. Obtain sign-off on system functions.
 - k. Train Owner's representative on system capabilities, operation, and maintenance, as specified in Part 3 under "Closeout Activities".
3. After Hours Startup; *Lutron LSC-AH-SU*: Include additional costs to perform manufacturer's start-up procedures outside normal working hours (Monday through Friday, 7am to 5pm).

- E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

1.5 ADJUSTING

- A. On-Site Scene and Level Tuning; *Lutron LSC-AF-VISIT*: Include additional costs for Lighting Control Manufacturer to visit site to conduct meeting with to make required lighting adjustments to the system for conformance with original design intent.

- B. Sensor Fine-Tuning: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits for fine-tuning of sensor calibration. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, Contractor to provide fine-tuning of sensor calibration.

3.6 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.7 COMMISSIONING

- A. See Division 01 for Commissioning Requirements.
- B. Title 24 Acceptance Testing Service; *Lutron LSC-SPV-DOC-T24*: Include costs for Lighting Control Manufacturer to perform lighting control acceptance testing in accordance with CAL TITLE 24 P6. Submit required documentation.

3.8 CLOSEOUT ACTIVITIES

- A. See Division 01 7800 - *Closeout Submittals*, for closeout submittals.
- B. See Division 01 7900 - *Demonstration and Training*, for additional requirements.
- C. Demonstration:
 - 1. Demonstrate proper operation of lighting control devices to owner, and correct deficiencies or make adjustments as directed.
 - 2. On-Site Performance-Verification Walkthrough; *Lutron LSC-WALK*: Include additional costs for lighting control manufacturer to provide on-site demonstration of system functionality.
- D. Training:
 - 1. Include services of manufacturer's certified service representative to perform on-site training of Owner's personnel on operation, adjustment, and maintenance of lighting control system as part of on-site system start-up services.
 - 2. Customer-Site Solution Training Visit; *Lutron LSC-TRAINING-SP*:
- E. On-Site Warranty Audit Visit; *Lutron LSC-WNTY-AUD*: Where Manufacturer On-Site Full-Scope Start-Up Service is not provided, include services of manufacturer to perform on-site verification that system meets manufacturer's requirements as necessary for validation of specified enhanced warranty.

3.9 MAINTENANCE

- A. See Section Division 01 – *Execution and Closeout Requirements*, for additional requirements relating to maintenance service.

3.10 PROTECTION

- A. Protect installed products from subsequent construction operations.

END OF SECTION 260425

SECTION 260450 - CABINETS AND ENCLOSURES

PART 1 - GENERAL

Applicable Provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install hinged cover enclosures to complete all work shown on the Drawings or specified herein.

1.2 REFERENCES

- A. NEMA 250 - Enclosures for electrical equipment (1000 volts maximum).
- B. Submittals - Submit product data under Provisions of Contract and Division 1.

PART 2 - PRODUCTS

2.1 HINGED COVER ENCLOSURES

- A. Construction: NEMA 250; Type 1 and 3R steel.
- B. Finished: Manufacturer's standard enamel finish.
- C. Covers: Continuous hinge, held closed by operable by key.
- D. Provide barriers between normal and emergency wiring. Barriers shall be of non-current carrying material of adequate thickness for mechanical strength but in no case less than 1/4". Each barrier shall have an angle iron framing support all around.

2.2 FABRICATION

- A. Shop assemble enclosures in accordance with ANSI/NEMA ISC 6.
- B. Provide knockouts on enclosures.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install enclosures plumb; Anchor securely to wall and structural supports at each corner, minimum.
- B. Provide necessary feet for free-standing equipment enclosures.
- C. Install trim plumb.

END OF SECTION 260450

SECTION 260500 - SUPPORTING DEVICES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install rigid metal conduit, electrical metallic tubing and flexible metal conduit, including all fittings to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

- A. Conduit and equipment supports.
- B. Fastening hardware.

1.3 REFERENCES

- A. Conduit supports.

1.4 QUALITY ASSURANCE

- A. Support system shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Support channel: Galvanized or painted steel.
- B. Hardware: Corrosion resistant.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fasteners in Pre-Cast Concrete: Fastener system of type for suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other necessary devices for attaching hangers of type required and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing in accordance to ASTM E1190 conducted by a qualified independent agency. Anchors shall not be installed where reinforcing strands are located in plank. Review pre-cast plank shop drawings to determine location.

- B. Refer to pre-cast concrete plank shop drawings for location of strand reinforcing and cores. Do not anchor where reinforcing is located. Use fasteners in concrete, toggle bolts or thru-core anchors with plates supported on top of plank in cores.
- C. Fasten hanger rods, conduit clamps, outlet, junction boxes to building structure using preset inserts, beam clamps and spring steel clips.
- D. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; Expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs and wood screws in wood construction.
- E. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- F. Do not use powder-actuated anchors.
- G. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- H. In wet locations install free-standing electrical equipment on concrete pads.
- I. Install surface mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch off wall.
- J. Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

END OF SECTION 230500

SECTION 260550 - GENERAL LABELING AND IDENTIFICATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install nameplates, tape labels, wire markers, conduit color coding to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

- A. Painting.

1.3 SUBMITTALS

- A. Submit shop drawings under provisions of Division 1.
- B. Include schedule for nameplates and tape labels.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Nameplates: Engraved three-layer laminated plastic, white letters on a black background.
- B. Tape labels: Embossed adhesive tape with 3/16 inch black letters on a white background.
- C. Wire and cable markers: Cloth markers, split sleeve or tubing type.

PART 3 - EXECUTION

3.1 INSTALLATION

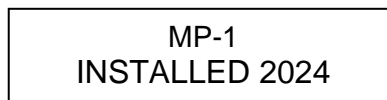
- A. De-grease and clean surfaces to receive nameplates and tape labels.
- B. Install nameplates and tape labels parallel to equipment lines.
- C. Secure nameplates to equipment fronts using screws, rivets, or adhesive. Secure nameplate to inside face of recessed panelboard doors in finished locations.
- D. Embossed tape will not be permitted for any application. Use embossed tape only for identification of individual wall switches and receptacles and control device stations.

3.2 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes and at load connection. Identify each branch circuit or feeder number for power and lighting circuits and each control wire number as indicated on equipment manufacturer's shop drawings for control wiring.

3.3 NAMEPLATE ENGRAVING SCHEDULE

- A. Provide nameplates to identify all electrical distribution, control equipment and loads served including year of installation. Letter height: 1/2 inch for individual switches, loads served, distributions and control equipment identification. For example:



- B. Panelboards: 3/4 inch, identify equipment designation. 1/2 inch, identify voltage rating and source of power.
- C. Individual circuit breakers, switches and motor starters in panelboards, switchboards and motor control centers: 1/4 inch, identify circuit and load served, including location.
- D. Individual circuit breakers, enclosed switches and motor starters: 1/2 inch, identify load served.

3.4 FIRE ALARM

- A. All fire alarm raceway components shall be painted red and identified.

END OF SECTION 260550

SECTION 260575 - INTERIOR LUMINAIRES

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. Interior luminaires and accessories.
- B. Emergency lighting units.
- C. Exit signs.
- D. LED Driver.
- E. LED dimming and controls.
- F. LED emergency power supply.
- G. Lamps.
- H. Luminaire accessories.

1.2 REFERENCES

- A. ANSI/IES RP-16-10 – Nomenclature and Definitions for Illuminating Engineering.
- B. ANSI C78.37 7 – Specifications for the Chromaticity of Solid-State Lighting (SSL) Products.
- C. IES LM-79-08 – Electric and Photometric Measurements of Solid-State Lighting Products.
- D. IES LM-80-08 – Measuring Lumen Maintenance of LED Light Sources.
- E. IES 7M-21-11 – Projecting Long Term Lumen Maintenance of LED Light Sources.
- F. IES LM-82-11 – IES Approved Method for the Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature.
- G. UL 8750 – LED Equipment for Use in Lighting Products.
- H. NEMA WD 6 - Wiring Devices – Dimensional Requirements.
- I. NFPA 70 - National Electrical Code.
- J. NFPA 101- Life Safety Code.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70 and to requirements of NFPA 101.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. (UL), American National Standards Institute (ANSI) and Illuminating Engineering Society (IES).

1.5 SUBSTITUTIONS

- A. All proposed substitutions must be submitted with each light fixture specification cutsheet, accompanied with footcandle calculation for all spaces, provided for Architect and Engineer's review, prior to approval.
- B. If the substitution is accepted, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring.

PART 2 - PRODUCTS

2.1 LUMINAIRES

- A. Furnish Products as scheduled.

2.2 EXIT SIGNS

- A. Manufacturers: As scheduled.
- B. Description: Exit sign fixture suitable for use as emergency lighting unit.
- C. Housing: Extruded aluminum or steel as per schedule.
- D. Face: Aluminum stencil face with red letters, unless otherwise noted.
- E. Directional Arrows: Universal type for field adjustment, direction per drawing.
- F. Mounting: Universal, for field selection or per drawing.
- G. Lamps: L.E.D.
- H. Input Voltage: As scheduled.

2.3 LED DRIVERS

- A. Manufacturers: As scheduled.

- B. Voltage: As scheduled.

2.4 LAMPS

- A. Lamp Types: As specified for luminaire. LED source.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- B. Support luminaires 2 x 4 foot (600 x 1200 mm) and larger in size independent of ceiling framing.
- C. All lay-in luminaires shall be supported with chains to building structure.
- D. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- E. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure. Provide auxiliary members spanning ceiling grid members to support surface mounted luminaires. Fasten surface mounted luminaires to ceiling grid members using bolts, screws, rivets, or suitable clips.
- F. Install wall mounted luminaires, emergency lighting units and exit signs at 80" above finished floor, unless otherwise noted.
- G. Install accessories furnished with each luminaire.
- H. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- I. Bond products and metal accessories to branch circuit equipment grounding conductor.
- J. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.

3.2 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 ADJUSTING

- A. Aim and adjust luminaires as indicated.
- B. Position exit sign directional arrows as indicated.

3.4 CLEANING

- A. Clean electrical parts to remove conductive and deleterious materials.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finished and touch up damage.

3.5 PROTECTION OF FINISHED WORK

- A. Relamp luminaires that have failed lamps as substantial completion.

END OF SECTION 260575

SECTION 260600 - DISCONNECT SWITCHES

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install disconnect switches, fuses and enclosures to complete all work shown on the Drawings or specified herein.

1.2 SUBMITTALS

- A. Submit product data under Provisions of Contract and Division 1.
- B. Include outline Drawings with dimensions, equipment ratings for voltage, capacity, horsepower and short circuit.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - DISCONNECT SWITCHES

- A. Siemens.
- B. Square 'D'.
- C. General Electric.
- D. Or approved equal.

2.2 DISCONNECT SWITCHES

- A. Fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch is in ON position. Handle lockable in OFF position. Fuse clips: Designed to accommodate class R, J fuses.
- B. Non-fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
- C. Enclosures: NEMA Type 1; 3R; 4 as indicated on Drawings.

2.3 ACCEPTABLE MANUFACTURERS - FUSES

- A. Bussman.

- B. Ferraz-Shawmut.
- C. Or approved equal.

2.4 FUSES

- A. Fuses 600 amperes and less: ANSI/UL 198E, class RK1; RK5; Dual element, current limiting, time delay, 250 volt.
- B. Interrupting rating: 200,000 rms amperes.
- C. An additional fuse of each size required to be supplied.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install disconnect switches where indicated on Drawings.
- B. Install fuses in fusible disconnect switches.
- C. Disconnects installed outdoors shall have NEMA 3R enclosures.
- D. Disconnects installed indoors in dry locations shall have NEMA 1 enclosure.

END OF SECTION 260600

SECTION 260650 - GROUNDING

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install the power system grounding to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

- A. Panelboards.
- B. Raceways.
- C. Connection Equipment.
- D. Electric Equipment.
- E. Tests and Acceptance.
- F. Transformers.
- G. Electric Service.

1.3 SUBMITTALS

- A. Manufacturers' data, catalog cuts of ground rods, connectors, bushings, etc., along with recommended installation procedures.

PART 2 - PRODUCTS

2.1 WIRING

- A. All wiring used for grounding shall be insulated copper, unless otherwise noted. Size shall be in accordance with code for the application, minimum #12.
- B. Where used in conjunction with computer equipment, grounding conductors shall be equal in size to the phase conductors.
- C. Avoid splices in ground conductors.

2.2 RACEWAY

- A. Grounding continuity shall be maintained for all metallic raceways.

- B. Provide bonding jumpers across metal parts separated by non-conducting materials.
- C. Where a grounding conductor is installed as a supplement to metallic raceway serving as the equipment grounding conductor, bonding conductor to the raceway at each end.
- D. All raceway accessories, such as locknuts, bushings, expansion fittings, etc. shall be installed to provide maximum metal-to-metal bonding.

2.3 CLAMPS

- A. Provide approved ground clamps for connecting grounding conductors to pipe, conduits, wireways, building steel, grounding rods, etc.
- B. Where bond will be in an inaccessible location or as an alternate to ground clamps, provide exothermic weld, similar to Cadweld.

2.4 ACCESSORIES

- A. Provide all necessary accessories of appropriate size and material for connection or termination of grounding conductors including:
 - 1. Straps.
 - 2. Clamps.
 - 3. Lugs.
 - 4. Bars and buses.
 - 5. Isolators (where applicable).
 - 6. Locknuts and bushings.

2.5 ACCEPTABLE MANUFACTURERS

- A. Copperweld.
- B. Cadweld (for exothermic welds).
- C. O.Z. Gedney.
- D. Burndy.

PART 3 - EXECUTION

3.1 SERVICE ENTRANCE/SWITCH

- A. Coordinate all bonding and grounding requirements of the service entrance with the utility company.
- B. Provide ground lug in each switchboard, minimum 25% of phase bus, along entire length of switchboard.

- C. Separately connect each ground to existing grounding electrode. Test existing grounding electrode for proper resistance values and provide all necessary modifications required.

3.2 TRANSFORMERS

- A. Bond each transformer secondary neutral to nearest building structural column or beam via transformer case grounding stud.
- B. Provide jumper between transformer case and all conduit bushings.
- C. Where a separate equipment-grounding conductor is provided the primary and/or secondary feeders; bond to transformer grounding stud.
- D. Where isolation shield is provided, bond to transformer grounding stud.
- E. Where a separate ground riser is provided in addition to or instead of building steel; bond transformer-grounding stud to the ground riser.

3.3 STRUCTURAL STEEL BUILDINGS

- A. Select a column common to aligned electric closets as the bonding column for grounding of transformer neutrals, isolated grounds and separate equipment grounding conductors.
- B. All grounding conductors in each closet shall be bonded in close proximity to one another.
- C. Where a grounding conductor to be bonded is not in proximity to the common column, bond to the nearest column or structural beam.
- D. Provide bonding jumper strap across all structural expansion joints where the grounding integrity of the structural system is reduced

3.4 RACEWAYS

- A. Grounding continuity is to be maintained for all metallic raceways. Provide necessary clamps, bushings, straps and locknuts to assure continuity.
- B. For non-metallic or flexible raceways, provide a separate equipment-grounding conductor bonded to both ends.
- C. Where indicated, an additional equipment-grounding conductor shall be provided in metallic raceway.
- D. Where indicated, an isolated ground conductor shall be provided in addition to the equipment-grounding conductor. Bond at each end to the isolated ground terminal identified.

3.5 EQUIPMENT

- A. All equipment shall be grounded.

- B. Where isolated grounding is indicated, it shall be for the isolation of internal equipment components only. All metallic enclosures of such equipment shall be connected to the equipment ground system.

3.6 PANELBOARDS

- A. All panelboards and distribution panels shall be provided with a ground bar bonded to the enclosure. Provide an isolated ground bar connected to the incoming feeder ground where indicated.

3.7 TESTING

- A. Upon completion of the installation, confirm the grounding continuity of all raceways, conductors and equipment. Maximum allowable resistance is 25 ohms.

3.8 RECORD DRAWINGS

- A. Submit record As-Built Drawings indicating the location of all points where grounding conductors are bonded to steel, rods, plates, etc.
- B. Indicate the location of all grounding buses not installed within distribution equipment.

END OF SECTION 260650

SECTION 260700 - PANELBOARDS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install the panelboards and to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

- A. Grounding
- B. Overcurrent Protection

1.3 SUBMITTALS

- A. Submit shop drawings for equipment and component devices under provisions of Division 1.
- B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- C. Furnish two (2) sets of keys to Owner.

1.4 REFERENCES

- A. FS W-C-375 - Circuit breakers, molded case, branch circuit and service.
- B. FS W-P-115 - Power distribution panel.
- C. NEMA AB 1 - Molded case circuit breakers.
- D. NEMA KS 1 - Enclosed switches.
- E. NEMA PB 1 - Panelboards.
- F. NEMA PB 1.1 - Instruction for safe installation, operation and maintenance of panelboard rated 600 volts or less.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - PANELBOARD AND LOAD CENTERS

- A. Siemens.

- B. Square "D".
- C. General Electric.
- D. Or approved equal.

2.2 BRANCH CIRCUIT PANELBOARDS

- A. Lighting and appliance branch circuit panelboards: NEMA PB 1; circuit breaker type.
- B. Enclosure: NEMA PB 1; Type 1.
- C. Cabinet size: Approximately 6 inches deep; 20 inches wide for 240 volt and less panelboards. Verify field conditions and alter dimensions to suit at no additional cost.
- D. Provide surface cabinet front door-in-door with concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.
- E. Provide panelboards with copper bus, rating as scheduled on Drawings. Provide copper ground bus in all panelboards and isolated ground bus in those as indicated on Drawings.
- F. Minimum integrated short circuit rating: 10,000 amperes rms symmetrical for 240 volt rated for 125 amps or less, 22,000 amperes rms symmetrical for 240 volt rated greater than 125 amps to 225 amps and 30,000 amperes for emergency power panelboards (verify in field). If panelboard is noted as a main distribution panelboard, than panel shall be rated as a distribution panelboard. Contractor shall provide short circuit study to ensure adequacy.
- G. Molded case circuit breakers: Bolt-on type thermal magnetic trip handle for all poles. Provide circuit breakers UL listed as type SWD for lighting circuits. Breaker handle to indicate ampere rating.

2.3 DISTRIBUTION PANELBOARDS

- A. Description: NEMA PB 1, circuit breaker type. The bus of all panels rated a minimum 400 amps shall be distribution type.
- B. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.
- C. Minimum integrated short circuit rating: 65,000 amperes rms symmetrical for 240 volt panelboards; 65,000 amperes rms symmetrical for 480 volt panelboards, unless otherwise noted on Drawings.
- D. Model Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR as specified on Drawings.

- E. Enclosure: NEMA PB 1, Type 1.
- F. Cabinet Front: Surface type, fastened with screws. Double hinged doors with flush lock, metal directory frame, finished in manufacturer's standard gray enamel. One hinged door to access breakers, the other to access wiring compartment.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards flush or surface mounted as indicated on Drawings.
- B. Mounting height maximum 6 ft. (2 m) to top circuit breaker.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide type written circuit directory for each branch circuit panelboard. Indicate loads served and panel name by matching that shown on panel schedules on Drawings. Revise directory to reflect circuiting changes required to balance phase loads. Provide a second copy and turn over to Owner.
- E. Provide 3/4" thick plywood backboard for mounting of panels. Paint backboard with fire retardant paint.
- F. Provide nameplates as indicated in Section 16550.

3.2 FIELD QUALITY CONTROL

- A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.
- B. Visual and mechanical inspection: Inspect for physical damage, proper alignment, anchorage and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.
- C. Provide thermographic inspections in accordance with Section 26 0100.

3.3 TESTS

- A. Submit certification that each panelboard has withstood, without breakdown, a factory dielectric (Hi-Pot) test consisting of a one minute application of a 60 cycle AC test voltage applied between phase legs and from each phase leg to enclosure.
- B. The applied test voltage shall have an RMS value of at least twice the line to line system voltage to which the panelboard is to be applied, plus one thousand volts (minimum 1500V).

22 March 2024
Issue for Bid

Katonah-Lewisboro Union Free School District
Additions and Alterations to Meadow Pond Elementary School
SED No. 66-01-01-03-0-007-016

3.4 RECORD DRAWINGS

- A. Submit As-Built Drawings indicating the location of all panelboards.

END OF SECTION 260700

SECTION 260725 - DISTRIBUTION SWITCHBOARD

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, vendors and the like shall meet all Con Edison requirements.

1.2 SUMMARY

- A. Work of this section shall be governed by the contract documents. Provide materials, labor, equipment and services necessary to furnish, deliver and install all work of this section as shown on the drawings, as specified herein and/or as required by job conditions.
- B. The work shall include, but not be limited to, indoor, low voltage switchboards of the circuit breaker, front accessible only, rear aligned, groove mounted type, as shown on the drawings and specified herein.

1.3 REFERENCES

- A. Related Work Specified Elsewhere
 - 1. General Conditions: Section 26 0100
 - 2. Overcurrent Protective Devices: Section 26 0320

1.4 INTENT AND CODES

- A. This specification describes the equipment required. It does not cover all phases of manufacture or assembly. Supplier shall assume the responsibility for providing well-integrated units of good quality.
- B. All codes, rules, regulations and ordinances governing this work, are as fully a part of this specification as if herein repeated or hereto attached. Where the requirements of this specification are more stringent than any applicable codes etc., the specification shall apply.

1.5 MATERIAL AND WORKMANSHIP

- A. Unless otherwise specified all materials shall be new. Supplier shall be responsible for defects in equipment and devices furnished but not manufactured by him. Exposed finishes and other features shall match in all respects. Supplier alone shall be responsible for all errors of fabrication and for correct fitting of all components that must be erected and joined in the field.

1.6 SHOP DRAWINGS

- A. Complete shop drawings showing size and arrangement of equipment, foundation and anchor bolt requirements, bill of materials, performance data and curves, wiring and elementary diagrams, methods of assembly, connections to other work and other pertinent data as called for in the various parts of this Specification shall be furnished by the Supplier for checking and approval.

1.7 MAINTENANCE AND OPERATING INSTRUCTIONS

- A. In addition to submittal for approval, furnish to the Owner's Representative six (6) copies of the items listed below for all equipment and material furnished under this specification.
- B. Each approved shop drawing, including all final comments, shall be folded down so that it can be placed in a loose leaf binder of the size using standard 8-1/2" x 11" paper. The drawings shall be folded in a manner that they can be fully opened without removal from the binder.
- C. Complete detailed parts lists and/or assembly drawings.
- D. All governing agencies' and/or manufacturer's test certificates, permits and inspection reports, insurance inspection and all shop or field performance tests, when required.
- E. All operating and maintenance manuals as required by this specification. Such manuals shall be edited to identify equipment furnished.
- F. Approved catalog cuts and/or material lists as required by this specification.
- G. The Manufacturer's Specification, including tabulation of sizes and identifying numbers for all installed material and equipment. The applicable items in each brochure shall be clearly defined and marked.
- H. List of recommended spare parts.
- I. All of the above items shall be assembled in books identified for units covered, including all assemblies and components. Each book shall contain Table of Contents page. Forward all the above information except for field test and/or field inspection reports to the Owner's Representative promptly after approval of shop drawings for each item and before delivery of any equipment involved.

1.8 INSPECTION AND SHOP TESTS

- A. Materials and/or equipment covered by this specification shall be subject to inspection by the Owner. Owner's Representative shall, during working hours, have access to all parts of the shop where material to be used in this equipment is being manufactured and shall be provided with all reasonable inspection facilities. Release of material and/or equipment shall not relieve the Supplier from contract responsibilities nor invalidate any claim which the Owner may make because of unsatisfactory materials and/or construction.

(If you put this in it means witness testing which is an expensive item. I would only do this for a job with extensive medium voltage and up equipment unless you want a road trip out of this. Same with B & C.)

- B. Operational tests required by the Owner's Representative during inspection to demonstrate that equipment and components comply with the specification, shall be made by the Supplier. Tests shall be made with all removable elements in place unless otherwise permitted by the Owner's Representative.
- C. Notify the Owner's Representatives of any scheduled test dates a minimum of one (1) week prior to factory test of equipment. All factory tests shall be witnessed by Owner's Representative unless otherwise directed and performance shall be complete to his satisfaction. A complete written report of tests specified herein shall be submitted promptly to the Owner's Representative

1.9 SHIPPING AND PROTECTION INSPECTION

- A. All material, equipment and component parts shall be adequately protected to prevent damage, corrosion or entry of foreign matter during shipment, unheated storage or in a dusty atmosphere.
- B. Each packing crate and carton containing components shall be visibly stenciled, clearly identifying contents as to the type(s) of unit(s) contained therein and the related equipment assembly or assemblies.
- C. Each shipment shall contain packing slip listing all components.
- D. For handling during shipment, lifting irons, eye bolts, or other lifting aids shall be bolted to the housing and shall not be removed until the equipment is in final position. The shipping sections may consist of completely assembled structures or sections of one or more units, as required to suit the handling facilities and to facilitate installation. Wiring that extends between sections to be terminated at accessible terminal blocks with wiring harnesses to facilitate field interconnections. Clearly identify all conductors and terminals.

1.10 SERVICE CONDITIONS

- A. The material covered by this specification shall be designed for operation under conditions where the altitude does not exceed 3300 feet and the temperature of the cooling air does not exceed 40 Degrees C. maximum, 30 Degrees C. average, unless otherwise specified.
- B. Construction shall conform to requirements for seismic restraints as specified in Section 26 0515.

1.11 GUARANTEE-WARRANTY

- A. Guarantee that all equipment meets the design and performance requirements specified and alter and/or replace, at no costs to the Owner, any piece of equipment which fails to meet these requirements. This shall include any field work and factory trained supervision necessary.

- B. All material included herein shall be free from defects and warranted for a period of 18 months from date of shipment of material from factory or 12 months from date of installation. Any parts found defective due to manufacture shall be replaced and reinstalled at no expense to the owner.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Scope

1. This part of the Specification covers the basic equipment and detailed construction requirements, and the required shop drawings to be submitted for the switchboard. All components, electric interconnections and accessories shall be designed and constructed in accordance with the latest applicable standards as recommended by the American National Standards Institute (ANSI), the National Electrical Manufacturers' Association (NEMA), the Institute of Electrical and Electronics Engineers (IEEE), the Underwriter's Laboratory (UL) as well as the construction details specified herein. In case of conflict between the aforementioned Standards and this Specification, the more stringent requirement shall apply.
2. Applicable requirements of all Local Codes shall also be complied with.
3. Switchboards shall conform to the following standards:
 - a. Underwriters Laboratories (UL) -
UL 891 - "Dead Front Electrical Switchboards".
Switchboards and its components shall be UL listed and labeled.
 - b. National Electrical Manufacturers Association
NEMA-PB2 - "Dead Front Distribution Switchboards".
NEMA-PB2.1 - General Instructions for proper handling, installation, operation, and maintenance of dead front distribution switchboards rated 600 volts or less.
4. The general arrangements, limiting dimensions, type and/or ratings are shown on the drawings accompanying this Specification. The basic equipment and detailed construction requirements for the various components entering into individual switchboards, shall be in accordance with the applicable provisions of this part. Coordinate the requirements of the various Parts of this Specification with the drawings when ordering equipment or material in accordance with the applicable provisions of this Part.

2.2 REQUIRED SHOP DRAWINGS

- A. Shop drawings shall be submitted as specified in Part 1 - General. As a minimum the following drawings shall be submitted for approval in accordance with the procedure indicated, falling into two categories.
- B. Drawings for Preliminary Approval to enable Supplier to proceed with equipment ordering and scheduling of fabrication:
 - 1. Front elevation, one line diagram showing main and branch circuit breaker ratings and types and any information required for complete identification and location of major equipment items, including dimension outline sizes, weights, shipping splits, and arrangement of all equipment.
 - 2. Voltage, phase, frequency, horizontal and vertical bus capacities, short circuit ratings.
 - 3. Floor plan and top view showing materials, sizes, anchoring, location of power and control conduit, and ground cable entries above and below.
 - 4. Preliminary Bill of Material or switchboard summary showing all major components.
 - 5. Preliminary schematic diagrams of nonstandard circuits.
- C. Detailed Engineering Drawings supplied to Owner promptly after approval of preliminary drawings.
 - 1. Wiring and schematic diagrams of all power circuits. Wiring diagrams shall be separate from schematic diagrams and shall show equipment arrangement, terminal numbers and point-to-point wiring of each piece of equipment and terminal block. Interconnection wiring diagram shall be furnished, showing general physical arrangement of all units and terminal blocks used in wiring between such units. The separate schematic diagrams shall include complete three line diagrams for buses, low-voltage switch and fuse units and any other devices in this Switchboard.
 - 2. Complete Bill of Material, or switchboard summary showing all components and materials, clearly describing same and providing numbers and data for checking.
 - 3. Detailed sections through all frames showing equipment, buswork, bus phasing connections (I) and ground stud assembly on bus.
 - 4. Detailed drawings showing provision for main and feeder bus extension and bus risers and indication of short circuit bracing.
 - 5. Handling, installation and assembly drawing.
 - 6. Final dimensioned outline drawings and accessories, phasing, location of jacking points, etc.
 - 7. Device connection diagrams.

8. Nameplate data sheets.
9. Cable lug type, quantities and sizes.
10. Operating and maintenance instruction manuals for all types of equipment.

2.3 LIMITING DIMENSIONS

- A. The dimensions indicated on the drawings are limiting and the orientation of the equipment shall be maintained. If a particular manufacturer's equipment exceeds any of the dimensions shown, it should be clearly stated in his proposal. The Owner will evaluate the cost of accommodating this equipment in the building design when reviewing his bid.

2.4 600 CLASS METAL-ENCLOSED SWITCHBOARD

A. General

1. Switchboard shall be indoor, free-standing, bolt-on circuit breaker type, group mounted, front accessible only, front and rear aligned and suitable for mounting against a wall, complete with all disconnects and accessories as shown on the drawings and specified herein.
2. Switchboards and buswork shall be fabricated to permit future expansion.
3. Where spaces for future circuit breaker units are shown, provide all current carrying components and covers, ready to receive the future units.
4. Provide nameplates for all units.

B. Enclosure

1. The entire assembly shall be totally metal enclosed, of indoor construction unless otherwise noted. Enclosures shall be fabricated of code gauge steel, formed and framed for rigidity. Fixed panels and framework shall be of bolted construction. Assembly shall be 90 inches high unless conditions require otherwise.
2. Cable compartments shall have adequate space for cables as required. Provide cable supports for each vertical section.
3. Housing shall be thoroughly cleaned and degreased after fabrication, bonderized and primed with zinc chromate. Finish shall be two coats of gray enamel, ANSI #61.

C. Buswork

1. Buswork shall be 3-phase, 4-wire fabricated of copper, tin or silver plated throughout extending the entire length of the assembly, ampere rating as shown on the drawings.
2. Main buswork shall have full capacity throughout the entire length of the switchboard. Vertical buswork shall be equal in size to the sum of the switch sizes in the vertical section including spares and spaces with a maximum size equal to

that of the main bus. Bus extensions to feeder switches and from the load side of the switches to the cable compartment shall be equal to the size of the switch. The continuous current ratings of the busses shall be determined by temperature rise as limited by ANSI standards and the National Electrical Code. Neutral bus shall be full sized, rating scale as the phase busses.

3. Provide an A-B-C bus arrangement, left to right, top to bottom, front to back, throughout as viewed from the front of the switchboard.
 4. Buswork shall be braced and supported to safely withstand short circuit stresses equal to the full available fault currents at the switchboard, minimum 100,000 AIC ampere RMS symmetrical.
 5. Provide two-hole long barrel compression cable connectors for cable as indicated per phase, neutral and ground on all incoming conductors.
 6. Provide bus tap lugs for connection of transient voltage surge suppressors as close to incoming conductors as possible.
 7. Ground bus shall be rated 25 percent of the phase busses with minimum size of 3 inches by 1/4 inch and be continuous for the entire length of the switchboard. Ground bus shall be accessible from the front of the switchboard. Ground bus shall be copper.
- D. Circuit Breaker - Provide thermal magnetic circuit breakers with interrupting capacity as shown on the Drawing. Where indicated on distribution schedule on drawing, provide circuit breakers with electronic trip units.
- E. Accessories
1. The following accessories shall be furnished with each switchboard.
 - a. One (1) quart of touchup paint.
 - b. One set of special wrenches, removable hand cranks, tools as required to maintain and disassemble parts of the switchgear for field maintenance.
- F. Approved Manufactures
1. The 600 volt class metal-enclosed switchboard shall be the product of one of the following approved manufactures:
 - a. General Electric Company - AV5
 - b. Square D I-line Switchboard
 - c. Eaton/Cutler Hammer Electric Corporation - POW-R-Line C, or equal.

PART 3 - EXECUTION

3.1 SHIPMENT

- A. Prior to shipment, all equipment shall be cleaned. All openings shall be covered to prevent entrance of foreign material. Where necessary, desiccant bags shall be located within cabinets to provide a minimum of 3 months protection.
- B. Equipment shall be shipped in sections to facilitate installation, complete with all accessories required for assembly. All wiring that extends between sections shall terminate on terminal blocks at the interface points, with a wiring harness (with framing strips) that will be field installed between adjacent sections. All terminal and wires shall be clearly marked with wire numbers.

3.2 INSTALLATION

- A. General: Install and connect switchboard equipment in accordance with approved manufacturer's shop drawings including supplemental devices required to make each unit a complete installation.
- B. Switchboards shall be anchored to two (2) 3-inch channel sills set flush with the concrete housekeeping pad. Provide all required shims, etc., to achieve a level installation.
- C. Mechanical Connections
 - 1. Make all required connections including split line connections.
 - 2. Remove shipping irons after equipment is set in place.
- D. Electrical Connections
 - 1. Bus connections: Use manufacturer's recommended torque.
 - 2. Install control wiring connections at shipping splits and coordinate with SCADA requirements for Emergency Switchboards.
 - 3. Provide holes in plates to allow for required conduit connections.
 - 4. Terminate low voltage cables.
 - 5. Ground conduits and cables as specified in Section 26 0200 and 26 0300.
 - 6. Insulating Tape: When main buses are insulated or enclosed by barriers, insulate with tape wrappings all cable connections for voltage level involved so no current carrying parts are exposed.
 - 7. Cable Blocks: support all outgoing secondary cables from cable blocks.

3.3 FIELD QUALITY CONTROL

A. Phase Sequence

1. Coordinate with the system supply for proper phase sequence throughout.
2. Provide phase sequence indicator on jobsite to verify all secondary outgoing feeder rotation.

B. Test all circuit breakers or fuses and switches for proper operation.

C. Bus Bar Connections

1. Check for proper resistance values using "Ducter" low resistance ohmmeter. Make adjustments where values exceed manufacturer's recommendations.
2. "Megger" phase bus bars to assure that no grounds or shorts are present. Disconnect potential and control transformers, instrument fuses and other equipment which may cause false readings.

D. Start-Up and Acceptance

1. Coordinate with equipment supplier and Owner for preparatory work required prior to energizing and acceptance and in accordance with Owner's start-up procedures.

E. Contractor shall leave the entire installation in perfect working order.

END OF SECTION 260725

SECTION 260750 - ELECTRIC SERVICE

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install the electric service system and to complete all work shown on the Drawings or specified herein.

1.2 WORK BY THIS CONTRACT

- A. Furnish and install primary and secondary equipment as follows:
 - 1. Furnish and install concrete equipment pads.
 - 2. Furnish and install secondary cables and conduit from utility transformer to building switchgear.
 - 3. Install utility service transformer.
 - 4. Furnish and install primary cables and ducts to splice or connect to utility equipment as shown on Drawings per Utility Company specifications.
- B. Coordinate all work with the utility company to insure timely completion of all work consistent with the schedule established by the Contractor.

1.3 WORK BY SITE CONTRACTOR

- A. Furnish and install the following:
 - 1. Furnish and install primary cables and conduit from utility company service end box to utility transformer including all terminations.
 - 2. Ground electric service and transformer as required.
 - 3. Install utility transformer.
 - 4. Furnish and install secondary conduit from transformer to within five (5) feet of building.

1.4 WORK BY UTILITY COMPANY

- A. Furnish and install the following:
 - 1. Furnish service transformers.

B. Furnish and/or install the following:

2. Furnish primary switchgear.
3. Furnish service transformers and network protectors.
4. Furnish current transformers.
5. Final connection to all primary equipment.

1.5 REFERENCE TO OTHER SPECIFICATION SECTIONS

- A. Raceways.
- B. Wire and Cable.
- C. Switchboards.
- D. Grounding.

1.6 SUBMITTALS

- A. Submit complete details of work as approved by the utility including components, routing and location.

1.7 QUALITY ASSURANCE

- A. Utility Company Standards.
- B. National Electrical Code (NEC).
- C. Underwriters Laboratories, Inc. (UL).

1.8 WORK BY ELECTRICAL CONTRACTOR

A. Furnish and/or install secondary equipment as follows:

1. Furnish and install secondary cables from utility transformer to building switchgear.
2. Furnish and install secondary conduit from within 5 ft. of building to switchgear room.
3. Furnish and install final connections on secondary utility transformer and building switchgear.
4. Furnish and install meter pan, current transformers and cabinets.
5. Furnish and install meter wiring.

6. Furnish and install switchgear grounding and bonding.
- B. Coordinate all work with the utility company and site work contractor to insure timely completion of all work consistent with the schedule established by the General Contractor.

PART 2 - PRODUCTS

2.1 SERVICE ENTRANCE CONDUIT

- A. Furnish and install conduit and cable as indicated in 1.2 A above.
- B. Conduit, fittings and accessories shall be in accordance with the "Raceways" section of this specification and concrete encased.

2.2 SERVICE ENTRANCE CONDUCTORS

- A. Furnish and install service entrance conductors between the utility transformer and building service equipment.
- B. Conductors shall be 600V, cable suitable for service entrance use. Cable type and installation shall be per the "Wire and Cable" section of this specification.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Before proceeding contact the utility company, to coordinate schedule of work by all trades effected by the work.
- B. Obtain copies of all utility design and installation standards applicable to the work to be performed.
- C. Obtain utility company approval for work to be performed.

3.2 INSTALLATION

- A. Before installation, submit applicable shop drawings including necessary details for the use of other trades.
- B. Should field conditions prevent installation as approved by the utility, obtain approval of deviations prior to installation.

3.3 RECORD DRAWINGS

- A. At completion submit complete as-built drawings to the Owner and the utility company including all dimensions necessary to identify exact location of work installed.

3.4 ACTIVATION OF SERVICE

- A. Upon completion of the installation, coordinate activation of the service with the utility company.
- B. Supply necessary manpower and miscellaneous work to facilitate activation.
- C. Advise all trades of time of activation and confirm that all equipment to be energized has been properly protected and is suitable to be placed into service.

END OF SECTION 260750

SECTION 260770 - SURGE SUPPRESSOR

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. This specification describes the mechanical and electrical requirements for a Surge Protection Device herein known and shown on all drawings as SPD. The SPD shall be suitable for application in category C High environments as described in ANSI/IEEE C62.41. The SPD shall be parallel in design and provide protection for the following modes: {Line to Neutral, Line to Ground, Line to Line, Neutral to Ground} for electrical distribution systems. "Series" type SPD units will be deemed unacceptable.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating weights, operating characteristics, furnished specialties, and accessories.
- B. Product Certificates: For surge protection devices, signed by product manufacturer certifying compliance with the following standards:
 - 1. UL 1283
 - 2. UL 1449 3rd Edition

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain suppression devices and accessories through one source from a single manufacturer
- B. Product Options: Drawings shall indicate size, dimensional requirements, and electrical performance of suppressors and are based on the specific system indicated.
- 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. Comply with NEMA LS 1, "Low Voltage Surge Protection Devices"
- E. Codes and Standards
 - 1. UL compliance and Labeling: Listed per UL 1449 3rd Edition.
 - 2. UL 1283 "Electromagnetic Interference Filters".
 - 3. Comply with ANSI/IEEE C62.1, C62.41, and C62.45.
 - 4. NEC compliance: Comply with NEC as applicable to construction and Article 280 for installation.

1.4 MANUFACTURERS QUALIFICATIONS

- A. Only pre-approved SPD products shall be accepted.
- B. Manufacturer Qualifications: All SPD units shall be manufacturer by a firm that strictly manufactures SPD products only, for at least 10 years. Firms must also regularly engage in the manufacturing of SPD products for Categories B (ANSI/IEEE 62.41) and C High.
- C. The SPD shall be warranted for no less than 15 years and shall include free replacement in whole or in part during those 15 years for any reason of failure.

PART 2 - PRODUCTS

2.1 SERVICE ENTRANCE SUPPRESSORS

- A. General: The A.C. Voltage Surge Protective Devices shall be a high speed, high current solid-state device designed to protect electronic equipment and electrical systems from transient over voltages. It shall limit the magnitude of a transient overvoltage present on the AC service or distribution power lines. The suppressor shall provide continuous bipolar, bidirectional, non-interrupting protection and be capable of instant automatic reset with no degradation in protection capabilities. The suppressor shall be solid state, utilizing 40mm metal oxide arrestors (MOV's). Gas tubes are not acceptable. It shall start to suppress the transient at a minimum of 115% of the peak voltage of the sinewave. The suppressor assembly shall be installed in parallel of the service main disconnect, distribution or branch panel main lugs. Connect the suppressor to over current protection sized with an AIC rating equal to or greater than the panel rating. The suppressor shall be contained in an enclosure appropriate for environmental application.
- B. Electrical Performance
 - 1. ANSI/IEEE Testing Minimum Requirements

	SVR UL	VPR UL	CAT B	CAT C High
	1449 2 nd	1449 3 rd	6kV/3kA	20kV/10kA
480Y/277	800V	1200V	776V	904V
208Y/120	400V	700V	416V	528V

- C. SPD specifics:
 - 1. The surge protection device shall be permanently wired through an over current device (specific size shall be specified by the manufacturer) installed in the service entrance electrical equipment (rated with the same electrical characteristics of the panel) with leads as short as possible and not to exceed 18 inches.
 - 2. Surge Protection Device Description - Modular Design with field replaceable modules and the following features and accessories:
 - a. Fabrication using bolted compression lugs for internal wiring

- b. Replaceable bolt down modules per phase. The use of single “Brick” Module and/or “Plug In” type module designs will not be accepted.
 - c. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
 - d. A 200,000 AIC Fused Rotary Disconnect.
 - e. Remote Audio/ Visual Alarm Panel.
 - f. UL Listed 1283 Extended Power Range Filter.
 - g. Green/Red LED Indicator lights for power and protection status.
Green = Power On / Protection Present Red = Failure
 - h. Normally Open / Normally Closed Form C Dry Contacts
 - i. Surge Event Counter.
- 3. Peak Single-Impulse Surge Current Rating shall be 240kA per phase.
 - 4. Standard unit housings shall be 16 gauge painted steel and match the NEMA rating of the panel board.
 - 5. Standard unit warranty must be for at least 15 years and be stated in the manufacturer’s literature.

D. Approved Manufacturers

- 1. Atlantic Scientific – ZoneMaster PRO Series or Equal. (contact Andy Topinka @ 862-210-8126)

2.2 DISTRIBUTION PANEL SUPPRESSORS

A. General: The A.C. Voltage Surge Protective Devices shall be a high speed, high current solid-state device designed to protect electronic equipment and electrical systems from transient over voltages. It shall limit the magnitude of a transient overvoltage present on the AC service or distribution power lines. The suppressor shall provide continuous bipolar, bi directional, non-interrupting protection and be capable of instant automatic reset with no degradation in protection capabilities. The suppressor shall be solid state, utilizing 40mm metal oxide arrestors (MOV’s). Gas tubes are not acceptable. It shall start to suppress the transient at a minimum of 115% of the peak voltage of the sinewave. The suppressor assembly shall be installed in parallel of the service main disconnect, distribution or branch panel main lugs. Connect the suppressor to over current protection sized with an AIC rating equal to or greater than the panel rating. The suppressor shall be contained in an enclosure appropriate for the environmental application.

B. Electrical Performance

- 1. ANSI/IEEE Testing Minimum Requirements

	SVR UL 1449 2 nd	VPR UL 1449 3 rd	CAT B 6kV/3kA	CAT C High
20kV/10kA				
480Y/277	700V	1000V	825V	950V
208Y/120	330V	600V	456V	550V

C. SPD specifics:

1. The surge protection device shall be permanently wired through an over current device (specific size shall be specified by the manufacturer) installed in the service entrance electrical equipment (rated with the same electrical characteristics of the panel) with leads as short as possible and not to exceed 18 inches.
2. Surge Protection Device Description - Modular Design with field replaceable modules and the following features and accessories:
 - a. Fabrication using bolted compression lugs for internal wiring
 - b. Replaceable bolt down modules per phase. The use of single "Brick" Module and/or "Plug In" type module designs will not be accepted.
 - c. Arrangement with wire connections to phase buses, neutral bus, and ground bus
 - d. UL Listed 1283 Extended Power Range Filter
 - e. Green/Red LED Indicator lights for power and protection status.
Green = Power On / Protection Present Red = Failure
 - f. Normally Open / Normally Closed Form C Dry Contacts
3. Peak Single-Impulse Surge Current Rating shall be 100kA per phase
4. Standard unit housings shall have a transparent front cover for complete visual inspection and monitoring the status of protection for each module, any onboard diagnostics, module configuration, and wiring configuration.
5. Standard unit housings shall be non-metallic and meet NEMA 1, 2, 3, 3S, 4, 4X, 12 and 13 classifications
6. Standard unit warranty must be for at least 15 years and be stated in the manufacturer's literature.

D. Approved Manufacturers

1. Atlantic Scientific Corporation – ZoneSentinel 100 Series or equal.
(contact Andy Topinka @ 862-210-8126)

2.3 BRANCH PANEL SUPPRESSORS

- A. General: The A.C. Voltage Surge Protective Devices shall be a high speed, high current solid-state device designed to protect electronic equipment and electrical systems from transient overvoltages. It shall limit the magnitude of a transient overvoltage present on the AC service or distribution power lines. The suppressor shall provide continuous bipolar, bi directional, non-interrupting protection and be capable of instant automatic reset with no degradation in protection capabilities. The suppressor shall be solid state, utilizing metal oxide varistors (MOV's). Gas tubes are not acceptable. It shall start to suppress the transient at a minimum of 115% of the peak voltage of the sinewave. The suppressor assembly shall be installed in parallel of the service main disconnect, distribution or branch panel main lugs. Connect the suppressor to over current

protection sized with an AIC rating equal to or greater than the panel rating. The suppressor shall be contained in an enclosure appropriate for the environmental application.

B. Electrical Performance

1. ANSI/IEEE Testing Minimum Requirements

	SVR UL	VPR UL	CAT B	CAT C High
	1449 2 nd	1449 3 rd	6kV/3kA	20kV/10kA
480Y/277	800V	1000V	890V	1200V
208Y/120	400V	500V	435V	730V

C. Surge Protection Devices details:

1. The surge protection device shall be permanently wired through an overcurrent device (specific size shall be specified by the manufacturer) installed in the service entrance electrical equipment (rated with the same electrical characteristics of the panel) with leads trimmed as short as possible and not to exceed 18 inches.
2. Surge Protection Device Description - Non-Modular Design with the following features and accessories:
 - a. 200,000 AIC Fused
 - b. Built in Audible Alarm
 - c. UL Listed 1283 Extended Power Range Filter
 - d. Green/Red LED Indicator lights for power and protection status.
Green = Power On / Protection Present Red = Failure
 - e. Normally Open / Normally Closed Form C Dry Contacts
3. Peak Single-Impulse Surge Current Rating shall be 80kA per phase
4. Standard unit housings shall be metallic in construction and meet NEMA 1,2,3,3S,4,4X,12, and 13 classifications
5. Standard unit warranty must be for at least 10 years and be stated in the manufacturer's literature.

B. Approved Manufacturers

1. Atlantic Scientific Corporation – ZoneDefender PRO Series or equal.
(contact Andy Topinka @ 862-210-8126)

PART 3 - EXECUTION

3.1 APPLICATION OF SPD

A. General

1. Apply SPD on the load side of the first main disconnect at the electrical service entrance switchboard and on the load side of the main overcurrent device at the electrical distribution panelboard.

2. Coordinate system voltage, wiring configuration, and location as shown on project drawings.

3.2 INSTALLATION OF SPD

- A. Service Entrance: Connect the SPD to a 60A Breaker with #6 AWG minimum conductors, #4 AWG maximum (for ease of dressing), to the Service Entrances panel being protected. The conductors are to be as short and straight as practically possible and shall not exceed 18 inches in length. The SPD shall be installed following the manufacturer's recommended practices and in compliance with all applicable codes.
- B. Distribution Panels: Connect the SPD to a 60A or 30A (whichever is specified by the manufacturer for that model) with #8 AWG minimum conductors, #4 AWG maximum (for ease of dressing), to the Distribution panels being protected. The conductors are to be as short and straight as practically possible and shall not exceed 18 inches in length. The SPD shall be installed following the manufacturer's recommended practices and in compliance with all applicable codes.
- C. Branch Panels: Install the SPD to with #10 AWG provided from the manufacturer to the Branch panels being protected. The conductors are to be kept as short and straight as practically possible and shall not exceed 18 inches in length that is provided. The SPD shall be installed following the manufacturer's recommended practices and in compliance with all applicable codes.

END OF SECTION 260770

SECTION 260780 - ELECTRICAL SUB-METER

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

- A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install the electrical sub-meter to complete all work shown on the Drawings or specified herein.

PART 2 - PRODUCTS

2.1 POWER METERS

- A. The meter shall be UL listed and CE marked.
- B. The meter shall be designed for Multifunction Electrical Measurement on 3 phase power systems. The meter shall perform to spec in harsh electrical applications in high and low voltage power systems.
 - 1. The meter shall support 3 Element Wye, 2.5 Element Wye, 2 Element Delta, 4 wire Delta systems.
 - 2. The meter shall accept universal voltage input.
 - 3. The meter's surge withstand shall conform to IEEE C37.90.1.
 - 4. The meter shall be user programmable for voltage range to any PT ratio.
 - 5. The meter shall accept a burden up to 0.018 W at 120 V.
 - 6. The meter shall accept a voltage input range of up to 576 volts Line to Neutral, and up to 721 volts Line to Line.
 - 7. The meter shall accept a current reading of up to 11 Amps continuous.
 - 8. The meter shall have color-coordinated voltage and current inputs.
 - 9. The meter shall have a phasor diagram, through software, that clearly shows wiring status.
- C. The meter shall use a dual input method for current inputs. Method one shall allow the CT to pass directly through the meter without any physical termination on the meter. The second method shall provide additional termination pass through bars, allowing the CT leads to be terminated on the meter. The meter must support both termination methods.
 - 1. Fault Current Withstand shall be 100 A for 10 seconds, 300 A for 3 seconds, and 500 A for 1 second.
 - 2. The meter shall be programmable for current to any CT ratio. DIP switches or other fixed ratios shall not be acceptable.
 - 3. The meter shall accept a burden of 0.005 VA per phase, Max at 11 A.
 - 4. The meter shall begin reading at 0.1% of the nominal current.
 - 5. Pass through wire gauge dimension of 0.177" / 4.5 mm shall be available.
 - 6. All inputs and outputs shall be galvanically isolated to 2500 V AC.
 - 7. The meter shall accept current inputs of Class 10: (0.005 to 11) A, 5 A Nominal, 18 A max and Class 2 (0.001 to 2) A, 1 A Nominal Secondary, 2 A max.

- D. The meter shall have an accuracy of +/- 0.1% or better for voltage and amperes, and 0.2% for power and energy functions. The meter shall meet the accuracy requirements of IEC62053-22 (Class 0.2%) and ANSI C12.20 (Class 0.2%). The meter shall have a Frequency measurement accuracy of not less than 0.007 Hz.
1. The meter shall provide true RMS measurements of voltage, - phase to neutral and phase-to-phase; and current, per phase and neutral.
 2. The meter shall calculate RMS readings, sampling at over 400 samples per cycle on all channels of measured readings continuously, with no cycle blind spots.
 3. The meter shall utilize 24 bit Analog to Digital conversion.
 4. The meter shall provide THD (Total Harmonic Distortion). Harmonic magnitude recording to the 40th order shall be available for voltage and current harmonics.
- E. The meter shall provide a simultaneous voltage and current waveform recorder.
1. The meter shall be capable of recording 512 samples per cycle for a voltage sag or swell or for a current fault event.
 2. The meter shall provide pre and post-event recording capability.
 3. The meter shall have a programmable sampling rate for the waveform recorder.
 4. The meter shall have an advanced DSP design that allows power quality triggers to be based on a 1 cycle updated RMS.
 5. Up to 319 events shall be recorded.
 6. The meter shall store waveform data in a first-in, first-out circular buffer to insure that data is always being recorded.
- F. The meter shall include a three-line, bright red, .56" LED display.
1. The meter shall fit in both DIN 92 mm and ANSI C39.1 round cut-outs.
 2. The meter must display a % of Load Bar on the front panel to provide an analog feel. The % Load bar shall have not less than 10 segments.
- G. The meter shall be available in transducer only version, with no display.
1. The transducer version shall mount directly to a DIN rail and provide RS485 Modbus or DNP3 output, as well as optional communication cards.
- H. The meter shall be a traceable revenue meter, which shall contain a utility grade test pulse allowing power providers to verify and confirm that the meter is performing to its rated accuracy.
- I. The meter shall include virtual measurement upgrade packs (V-Switch™ keys), which shall allow user to upgrade in field without removing installed meter.
1. The four Virtual Upgrade packs shall be:
 - a. Volts, Amps, kW, kVAR, PF, kVA, Freq., kWh, kVAh, kVARh, and I/O Expansion - V1
 - b. Above with 2 Megabytes of memory for Data-logging - V2
 - c. Above with 128 samples per cycle waveform recording and 10 Megabytes memory – V3.

- d. Above, with 512 samples per cycle waveform recording and 128 Megabytes memory - V4.
 2. The V-Switch™ keys must be able to be implemented without physically removing the installed meter.
- J. The meter shall include 2 independent communications ports on the back and face plate, with advanced features.
1. One port shall provide RS485 communication speaking Modbus ASCII, Modbus RTU, or DNP3 protocol through the back plate. Baud rates shall be from 1200 baud to 57600 baud for the RS485 port.
 2. The meter shall have a USB port (through the faceplate) as the second standard communication port, which shall allow the unit to be set up and programmed using a laptop computer. Baud rate for the USB port shall be 57600; Modbus ASCII protocol, no Parity, 8 Data bits, and 1 Stop bit shall be supported.
- K. The meter shall provide user configured fixed window or rolling window demand. This shall allow the user to set up the particular utility demand profile.
1. Readings for kW, kVAR, kVA and PF shall be calculated using utility demand features.
 2. All other parameters shall offer max and min capability over the user selectable averaging period.
 3. Voltage shall provide an instantaneous max and min reading displaying the highest surge and lowest sag seen by the meter.
 4. The meter shall provide an update rate of every 6 cycles for W, VAR and VA and Wh, VARh, and VAh. All other parameters shall be every 60 cycles.
- L. The meter shall support a power supply of (90 to 265) V AC or (100 to 370) V DC. Universal AC/DC Supply shall have a burden of 10 VA max. An optional power supply of (18 to 60) V DC shall be available.
- M. The meter shall provide Limits/Alarms and control capability as follows:
1. Limits can be set for any measured parameter.
 2. Up to 16 limits can be set.
 3. Limits shall be based on % of Full Scale settings.
 4. Manual relay control shall be available through software.
 5. Relay set delays and reset delays shall be available.
 6. Relay control shall be available through DNP3 over Ethernet with the Ethernet Option card.
- N. The meter shall have data logging capability of up to 128 MB memory. The meter shall have a real-time clock that allows for time stamping of all the data in the meter when log events are created.
1. The meter shall have up to six historical logs for trending profiles. Each log shall be capable of being programmed with up to 64 parameters. The user shall have the ability to allocate memory between the three historical logs in order to increase

- or decrease the memory allotted to each of the logs. The duration of a historical log with 4 data channels being recorded at 15 minute intervals shall be 76 months.
2. The meter shall have a log for Limits/Alarms. The Limits log shall provide magnitude and duration of an event, time-stamp, and log value. The log must be capable of recording up to 2048 events.
 3. The meter shall have a log for System Events. The System Events log shall record the following occurrences with a time-stamp: Demand Resets, Password Requests, System Startup, Energy Resets, Log Resets, Log Reads, Programmable Settings Changes, and Critical Data Repairs.
 4. The meter shall have a log for I/O changes. The I/O Change log shall provide a time-stamped record of any Relay Outputs and any Input Status changes. The log must be capable of recording up to 2048 events.
 5. The meter with Virtual Upgrade packs 3 and 4 shall have a log which is capable of recording a waveform both when a user-programmed value goes out of limit and when the value returns to within limit. Up to 319 waveform events can be stored.
 6. The meter shall have a log for PQ events, with millisecond recording of waveform events.
- O. The meter shall have I/O expandability through two Option card slots on the back.
1. The cards shall be capable of being installed in the field, without removing the meter from installation.
 2. The meter shall auto-detect the presence of any I/O Option cards.
 3. The Option card slots shall accept I/O cards in all of the following formats: 100BaseT Ethernet Communication Card; Four Channel Bi-directional 0-1mA Output Card; Four Channel 4-20mA Output Card; Two Relay Outputs/2 Status Inputs Card; Four Pulse Outputs/4 Status Inputs Card; Fiber Optic Card; IEC 61850 Protocol Ethernet Network Card; RS232/RS485 Serial Communication Card.
 4. The meter shall be capable of accepting any combination of up to two cards.
 - a. When two Ethernet cards are installed in the meter, an independent IP address and MAC address shall be assignable to each card.
 5. The Ethernet Option Card shall provide the meter with 100BaseT Ethernet functionality. The Ethernet Option card shall:
 - a. Allow the meter to speak with 12 simultaneous sockets of Modbus TCP, so that multiple requests for data can be received simultaneously.
 - b. Allow the meter to speak with 5 simultaneous sockets of DNP3 over TCP/IP.

- c. Allow the meter to speak with both Modbus TCP and DNP3 over Ethernet simultaneously.
 - d. Allow auto transmit/receive detection for straight or crossover RJ45 cables.
 - e. Provide an embedded Web server that allows access to metered readings through the Internet, using any standard Web browser from a PC, smart phone, or tablet PC.
 - f. Provide email on configured alarms.
 - g. Provide email notification of meter status and reading data on a programmed schedule.
6. The 1mA Option Card shall provide the following features:
- a. 4 channel, bi-directional 0-1 mA outputs.
 - b. Assignable to any measured parameter.
 - c. 0.1% of Full Scale accuracy throughout range and load.
 - d. Maximum load impedance to 10 k Ω , with no accuracy losses.
7. The 20mA Option Card shall provide the following features:
- a. 4 channel, 4-20 mA outputs.
 - b. Assignable to any measured parameter.
 - c. 0.1% of Full Scale accuracy throughout range and load.
 - d. Maximum load impedance to 850 Ω , with no accuracy losses.
 - e. Loop powered using up to 24 V DC.
8. The Relay Output/Status Input Option Card shall provide the following features:
- a. 2 Relay outputs, 2 Status inputs.
 - b. Status Inputs – Wet/Dry Auto Detect up to 150 V DC.
 - c. Trigger on user-set Limits/Alarms.
 - d. Set delays and Reset delays.
9. The Pulse Output/Digital Input Option Card shall provide the following features:
- a. 4 KYZ pulse/4 Status inputs.
 - b. Programmable to any energy parameter and pulse value.
 - c. Programmable to End of Interval pulse.
 - d. Can function for manual relay control and limit based control.
 - e. 120 mA continuous load current.
 - f. DNP3 input.
10. The Fiber Optic Option Card shall provide the following features:
- a. Built in logic to mimic RS485 half-duplex bus, allowing the user to daisy chain meters for low installation cost.
 - b. ST Terminated Option.
 - c. Versatile Link Terminated Option.
 - d. Modbus and DNP3 protocols available.

11. The IEC 61850 Protocol Ethernet Network Option Card shall provide the following features:
 - a. Integrates into any IEC 61850 network.
 - b. Provides support for Modbus TCP and IEC 61850 protocols simultaneously.
 - c. Configurable for multiple logical nodes.
 - d. Provides buffered and unbuffered reporting.
 - e. Is certified by a 3rd party Authorized IEC 61850 Test Laboratory.
 - f. Is capable of supporting two Ethernet cards with separate /IP addresses, each running IEC 61850 protocol.

12. The RS1S Communication card adds another serial communication port - either RS232 or RS485.

- P. The meter shall have transformer loss, line loss, and total substation loss compensation.
 1. Substation losses shall be programmable for Watts and VARs, and for Ferris and Copper losses.

- Q. The meter shall compensate for errors in current transformers and potential transformers.
 1. Errors shall include voltage, multipoint current, multiphase angle, and better than .01% resolution.

- R. The meter shall internally record and store Time of Use data in a perpetual TOU calendar.
 1. The following Time of Use parameters must be included:
 - a. Bi-directional consumption and demand.
 - b. Configurable accumulators.
 - c. Up to four seasons and 12 months.
 2. The meter must provide the following TOU information for all rates in real time:
 - a. Current month accumulations.
 - b. Previous month accumulations.
 - c. Current season (or weekly, or daily) accumulations.
 - d. Previous season (or weekly, or daily) accumulations.
 - e. Total accumulations to date.
 - f. Cumulative Demand.
 - g. Continuous cumulative demand shall be available.

- S. The meter shall provide multi-level Cyber Security:
 1. The meter shall have highly secure encrypted passwords of up to 30 characters in length.
 2. The meter's security shall allow for 9 user IDs and passwords.
 3. There shall be one admin level and up to 8 customizable user levels.

- 4. There shall be password fail timeouts.
 - 5. Password restriction shall be available for most meter functions.
- T. The meter shall be able to be stored in (-20 to +70) °C.
- 1. Operating temperature shall be (-20 to +70) °C.
 - 2. NEMA 1 faceplate rating shall be available.
 - 3. Humidity rating to 95% R.H.
 - 4. Standard conformal coating on PCBs.
- U. The meter shall have a standard 4-year warranty.
- V. The following options shall be available for ordering:

Model	Frequency	Current Input	V-Switch™ Pack	Power Supply	I/O Slot 1	I/O Slot 2
Shark@250: Meter/Transducer	-60: 60 Hz system	-10: 10A Secondary	-V1: Multifunction measurement	-D2: 90-265 V AC/DC	-X: None	-X: None
Shark@250T: Transducer	-50: 50 Hz system	-2: 2A Secondary	-V2: Above & 2 MB memory	-D: 18- 60 Volts DC	-INP100S: 100BaseT Ethernet	-INP100S: 100BaseT Ethernet
			-V3: Above & 10 MB memory, 128 samples per cycle waveform recording		-RO1S: 2 Relays/2 Status Inputs	-RO1S: 2 Relays/2 Status Inputs
			-V4: Above & 128 MB memory, 512 samples per cycle waveform recording		-PO1S: 4 Pulses/4 Status Inputs	-PO1S: 4 Pulses/4 Status Inputs
					-1mAOS: 4 Channel Analog Output, 0-1 bi- directional	-1mAOS: 4 Channel Analog Output, 0-1 bi- directional
					-20mAOS: 4 Channel Analog Output, 4-20 mA	-20mAOS: 4 Channel Analog Output, 4-20 mA
					-FOSTS: Fiber Optic Output ST Terminated	-FOSTS: Fiber Optic Output ST Terminated

			-FOVPS: Fiber Optic Output Versatile Link Terminated	-FOVPS: Fiber Optic Output Versatile Link Terminated
			-INP300S: IEC 61850 Protocol Ethernet Network Card	-INP300S: IEC 61850 Protocol Ethernet Network Card
			-RS1S: RS232/RS485 Communication card	-RS1S: RS232/RS485 Communication card

W. Acceptable product is Electro Industries/GaugeTech, Model: Shark®250-60-10-V1-D2-INP100S-INP300S.

1. Add the following suffixes for added options:
 - a. E205301: RS485 to USB Communication Converter
 - b. E169305: USB-A to USB Mini-B cable.
 - c. Unicom 2500: Isolated RS485 to RS232 Converter
 - d. Unicom 2500-F: Isolated RS485 to RS232 to Fiber Optic Converter
 - e. Modem Manager, Model #, MM1: RS485 to RS232 Converter for Modem Communication
 - f. Certificate of Calibration, Part #, Ccal: This provides Certificate of Calibration with NIST traceable test data.
 - g. COMEXT4: Communicator EXT™ 4.0 Software application

2. For specification information, contact:
Electro Industries/GaugeTech
1800 Shames Drive
Westbury, NY 11590
Phone: 516-334-0870
Fax: 516-338-4741
www.electroind.com

END OF SECTION 260780

SECTION 260800 – ADDRESSABLE FIRE PROTECTIVE SIGNALING SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 FIRE ALARM SYSTEM

- A. The existing fire alarm system is an addressable system. The fire alarm control panel is located in the boiler room.
- B. Add and modify as required to the existing system, as specified/shown on the drawings and as per field requirements. All devices shall be suitable for operation and compatible with existing system. Provide relays modules, cards, power supplies, etc. as required.
- C. Provide sufficient quantity of relays for fan shutdown as specified/shown on Drawings.
- D. Connect, test and leave the system in first class operating condition.
- E. The system shall maintain all applicable Local, State and National Codes including the National Electrical Code, NPFA-72, NFPA-101, ADA 1971 and NEC. The system shall be listed by Underwriter's Laboratories, Inc.
- F. The Electrical Contractor shall provide a manufacturer's certified technician to supervise installation, adjustments, final connection and system testing.
- G. Fire alarm wiring and cable shall be per manufacturer's requirements.
- H. Fire alarm system test shall be in accordance with NFPA-72 and local fire department requirements.

END OF SECTION 260800

SECTION 260900 - GUARANTEE

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 GUARANTEE

- A. The Contractor shall remove, replace and/or repair at his own expense and at the convenience of the Owner, any defects in workmanship, materials, ratings, capacities and/or characteristics occurring in the work within one (1) year or within such longer period as may be provided in the Drawings and/or Section of the Specifications, which guarantee period shall commence with the final acceptance of the entire Contract in accordance with the guarantee provisions stated in the General Conditions, and the Contractor shall pay for all damage to the system resulting from defects in the work and all expenses necessary to remove, replace, and/or repair any other work which may be damaged in removing, replacing and/or repairing the work.

END OF SECTION 260900

