PROJECT MANUAL AND SPECIFICATIONS FOR:

2023 CAPITAL IMPROVEMENTS PROJECT

ODESSA-MONTOUR CENTRAL SCHOOL DISTRICT
300 COLLEGE AVENUE
ODESSA, NY 14869

SED NO. 55-01-01-04-5-003-012 – Bus Garage

VOLUME 1 of 1

Arcadis
59-61 Court Street, Suite 300
Binghamton, New York 13901
tel 607-772-0007
website www.arcadis.com

Document Set No.

Exp. 02/28/2027

DATE: April 16, 2025
SED APPROVAL DATE: September 22, 2025

ARCADIS PROJECT NO. 143500-2

PROJECT MANUAL AND SPECIFICATIONS FOR:

2023 CAPITAL IMPROVEMENTS PROJECT

Odessa-Montour Central School District
300 College Avenue
Odessa, NY 14869

SED Nos. 55-01-01-04-5-003-012 – Bus Garage

THE DESIGN OF THIS PROJECT CONFORMS TO ALL APPLICABLE PROVISIONS OF THE NEW YORK STATE UNIFORM FIRE PREVENTION AND BUILDING CODE, THE NEW YORK STATE ENERGY CONSERVATION CODE, AND THE BUILDING STANDARDS OF THE NEW YORK STATE EDUCATION DEPARTMENT.

ARCHITECT/ENGINEER
Arcadis
59-61 Court Street, Suite 300
Binghamton, New York 13901
Telephone: 607-772-0007
Website: www.arcadis.com

Exp. 02/28/2027

Date: April 16, 2025
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Arcadis Project No. 143500-2

SPECIFICATIONS

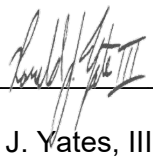
FOR

ASBESTOS ABATEMENT

OWNER

SED NOS. 55-01-01-04-5-003-012 – Bus Garage

I, Ronald J. Yates an EPA Certified Project Designer, do hereby certify that, to the best of my knowledge, information and belief, the plans and specifications are in accordance with the applicable requirements of the New York State Uniform Fire Prevention and Building Code, the state Energy Conservation Construction Code, Construction Standards of the Education Department, United States Environmental Protection Agency 40 CFR Part 763, and the New York State 6 NYCRR Part 56, Title 12.



Ronal J. Yates, III; PE, LEED AP, CAPD

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DATE: April 16, 2025

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2023 CAPITAL IMPROVEMENT PROJECT - PHASE 3

ARCHITECT: ARCADIS
59-61 COURT STREET, SUITE 300
BINGHAMTON, NY 13901

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Bus Garage

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DIVISION 00 - BIDDING AND CONTRACT REQUIREMENTS

DOCUMENT 00 11 13

INVITATION TO BID

A. PROJECT

1. The Odessa-Montour Central School District invites sealed bids to be received for the 2023 Capital Improvements Phase 2 project.
   Prospective bidders are invited to submit their stipulated sum bids, including applicable Alternates and unit prices, for work described in general as follows:

   A. CONTRACT NO. 1 – GENERAL CONSTRUCTION
   B. CONTRACT NO. 2 – MECHANICAL CONSTRUCTION
   C. CONTRACT NO. 3 – ELECTRICAL CONSTRUCTION
   D. CONTRACT NO. 4 – PLUMBING CONSTRUCTION
   E. CONTRACT NO. 5 – FOOD SERVICE CONSTRUCTION

2. The project shall be substantially complete in accordance with Document 00 21 13 and Section 01 10 00 for all work as indicated on the Contract Documents.

3. The Owner will receive sealed stipulated sum bids from qualified bidders at Odessa-Montour Central School District Office, 300 College Avenue, Odessa, NY 14869 until 2:00 PM Local Time, on October 30, 2025 at which time the bids will be opened and publicly read aloud.

4. Information and Bidding Documents for the Project can be viewed and obtained under public projects at the following designated website: http://www.arcadisplanroom.com/.
   Bidding Documents may be viewed and bid packages may be obtained from the designated website by prospective bidders via the ordering instructions on the "details" tab within the portal. Please read these instructions before ordering a bid package, as they will outline the checkout process for electronic deposits. Bid packages must be obtained from the designated website in order to be considered a "responsible bidder".
   Bidders who register as a plan holder may acquire the bidding and contract documents through the website using the following options:

   - Documents are available to view for free.
   - Hard copy sets can be obtained by electronically depositing the sum of one hundred dollars ($100) for each printed set of documents via the designated website. Shipping and handling is to be paid directly to Dataflow and is non-refundable. Digital sets will be available for download for a non-refundable fee to be paid directly to Dataflow. All official notifications, addenda, and other bidding documents will be offered only through the designated website with notifications to registered bidders. Neither Owner, CM nor Architect/Engineer will be responsible for bidding

documents, including addenda, if any, obtained from sources other than the designated website.

- All prospective bidders using the deposit method, upon returning the first complete set of plans and specifications in good condition within thirty (30) calendar days after the date of award of contracts or rejection of bids, will be refunded the full amount of their deposit for the first set of plans and specifications. For the return of any additional sets of plans and specifications within thirty (30) calendar days after the date of award of contracts or rejection of bids, they will be refunded the full amount of their deposit for one (1) set of plans and specifications less the actual cost of reproduction of the plans and specifications.
- The Owner requires that all bids shall comply with the bidding requirements specified in the INSTRUCTION TO BIDDERS. The Owner may, at their discretion, waive informalities in bids, but is not obligated to do so, nor does this represent that he will do so. The Owner also reserves the right to reject any and all bids. Under no circumstances will the Owner waive any informality which, by such waiver, would give one bidder a substantial advantage or benefit not enjoyed by all other Bidders. No bidder may withdraw his Bid before forty-five (45) days after the actual date of the opening thereof, unless a mistake due to error is claimed by the bidder in accordance with INSTRUCTIONS TO BIDDERS.

For printed portions of the documents or download, the fee is dependent on the size of the documents.

5. Copies of the Contract Documents may be examined at the following offices:

b. Arcadis
59-61 Court Street
Binghamton, New York 13901

c. Builders Exchange of the Southern Tier-East
15 Belden Street
Binghamton, New York 13903-2159

d. Syracuse Builders Exchange
6563 Ridings Road
Syracuse, New York 13206

f. Mohawk Valley Builders Exchange, Inc.
10 Main Street
Suite 202
Whitesboro, NY 13492

i. Construction Contractors Assoc.
330 Meadow Avenue
Newburgh, New York 12550

6. Each bidder must deposit a bid security in the form of a Bid Bond, Certified Check, or Cashier's Check payable to the Owner in the amount of not less than five percent (5%) of the Base Bid amount.

7. The Owner reserves the right to award the contract within forty-five (45) calendar days after the actual date of the receipt of the bids. No bidder may modify or withdraw their bid within forty-five (45) calendar days after the time and date specified for the receipt of bids.

8. The Owner reserves the right to waive any irregularities or informalities in the bid forms or during bidding procedures, and the right to reject any or all bids.

9. Special attention is called to prospective bidders that a Pre-Bid Conference will be held at ODM District Conference Room at 1:00 PM, October 13th, 2025. Project sites will be available for bidders to inspect proposed work areas from 9:00 AM to 3:00 PM on weekdays by appointment with Andrew Knowles, Cell# 607-346-3980.

Signed: Jennifer Stevenson
District Clerk

Dated: September 29, 2025

END OF DOCUMENT

DOCUMENT 00 11 13

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Signed: Jennifer Stevenson
District Clerk

Dated: September 29, 2025

END OF DOCUMENT

DOCUMENT 00 21 13

INSTRUCTIONS TO BIDDERS

1 PART 1 GENERAL

1.1 DEFINITIONS

A. Bidding Documents include the Project Manual and the proposed Contract Documents. The Project Manual consists of the Invitation to Bid, Instructions to Bidders, Information Available to Bidders, the Bid Form, Wage Rates, and other sample bidding and contract forms. The proposed Contract Documents consist of the Form of Agreement between the Owner and Contractor, Conditions of the Contract, including Supplementary Conditions, Drawings, Specifications, and all Addenda issued prior to execution of the Contract.

B. Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A232, 2019 Edition, are applicable to the Bidding Documents.

C. Addenda are written or graphic instruments issued by the Architect/Engineer prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications, or corrections.

D. A Bid is a complete and properly signed proposal to do the work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

E. The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which the Work may be added or from which Work may be deleted for sums stated in Alternates.

F. An Alternate is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

G. A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.

H. A Bidder is a person or entity who submits a Bid.

2 PART 2 BIDDER'S OBLIGATIONS

2.1 EXAMINATION OF BIDDING DOCUMENTS AND LOCATION OF WORK

A. The Bidder has read and understands the Bidding Documents and the Bid is made in accordance with the stated requirements.

B. The Bidder has read and understands the Bidding Documents or proposed Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, for other portions of the Project, if any, being bid concurrently or presently under construction.

C. Before submitting a Bid, each Bidder shall carefully examine and visit the site of the work. Each Bidder shall fully inform himself prior to bidding as to all existing conditions and limitations under which the work shall be performed, and they shall include in their bid a sum to cover all costs of all items necessary to perform the work as set forth in the Bidding Documents. No allowance will be made to any bidder because of lack of such examination or knowledge. The submission of a bid will be construed as conclusive evidence that the bidder has made such examination.

2.2 CONDITIONS OF THE WORK

A. Each Bidder shall inform himself of all conditions relating to the construction and labor under which the work shall be performed. Failure to do so will not relieve a successful bidder of their 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 consideration set forth in their bid.

B. Each Bidder, in carrying out of their work, must employ such methods or means as will not cause any interference with the work of any other Contractor, Owner's occupancy requirements, and safety of persons and property.

C. Each Bidder shall schedule the work in cooperation with the Owner so that efficient and coordinated progress of all work occurs.

D. Refer to Paragraph 2.3 of this Document for project start and completion dates. Each Prime Contractor shall prepare their bid to reflect completion within the dates indicated.

2.3 START OF WORK AND TIME OF COMPLETION

A. Time is of the essence. Work of this Contract, specifically ordering of materials, shall be started within ten (10) working days after receipt by the successful contractor of a "Notice to Proceed" from the Owner.

B. All Bidders are advised that work is required to be coordinated to allow for Owner’s continued use of all facilities.

C. On or before August 27, 2027, all work as indicated in the Contract Documents shall be substantially complete. At that time, and upon the work of this Contract being substantially complete, the Architect will issue a Certificate of Substantial Completion which will establish the date of substantial completion. Within fifteen (15) working days from the date of substantial completion, the Contractor shall have fully completed the work of the Contract, as specified.

D. Contractor and bonding companies shall be held strictly accountable for the completion of the Contractor's work per the specified schedule as a condition to satisfactory contract performance.

2.4 PRE-BID CONFERENCE

A. Special attention is called to prospective bidders that a Pre-Bid Conference will be held at the School District's Conference Room, at 1:00pm October 13, 2025. Representatives of the Owner, Architect/ Engineer, and Construction Manager will be present to review the project scope and to provide those present with interpretations and/or directions.

B. All proposed work shall be inspected only at the above time by all prospective bidders. Any questions or interpretations resulting from on-site inspection of proposed work shall be addressed to the Architect in writing.

2.5 PROOF OF COMPETENCY OF BIDDERS

A. Bidders must be skilled and regularly engaged in the class of work bid for and, if required by the Architect, must submit satisfactory evidence of mechanical facilities and financial ability to do the work within the agreed time and in accordance with all requirements of the Contract.

B. The Owner reserves the right to reject any bid if the evidence by the Bidder is not submitted as above indicated or if the evidence submitted by or investigation of any such bidder fails to satisfy the Owner that any such bidder is responsible or is able or qualified to carry out the obligations of the Contract or to complete the work as contemplated therein.

C. The successful bidder or bidders will be required to keep the entire work of the Contract, or their respective Contracts, at all times under their control.

D. Bidders are hereby notified that only those submitting Bonds rated A X, or better, as per the Best Rating Guide, will be considered for award of contract. Bonding of lesser rating will be considered an irregularity in the submitted Bid, and as defined elsewhere in those documents will be reason for rejection of the Bid by the Owner.

3 PART 3 BIDDING DOCUMENTS

3.1 AVAILABILITY

A. Each Prime Contractor or Sub-Contractor bidding the work may view, purchase downloaded documents, or purchase printed documents off a secure website. There is no cost to view the documents but there is a fee to download or print them. A complete printed set may be obtained for a deposit fee of $50.00, refer to Document 00 11 13. For printed portions of the documents or download, the fee is dependent on the size of the documents. Bidding Documents may be obtained by contacting the office of the Architect/Engineer:

Arcadis
59-61 Court Street, Suite 300
Binghamton, New York 13901
607-772-0007 or visiting http://www.arcadis.com

B. No bid deposit is required to view the bidding document.

C. No refunds will be given for downloading documents.

3.2 INTERPRETATION OR CORRECTIONS OF THE BIDDING DOCUMENTS

A. The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently to the extent that it relates to the Work for which the Bid is submitted, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.

B. Interpretations, corrections, and changes of the Bidding Documents will be made by Addendum. Interpretations, corrections, and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely on them.

3.3 EQUIVALENTS

A. Equivalent: A product or system, proposed for inclusion in the base bid, prior to the award of contract, whose components or characteristics are identical to, or exceed, the specified criteria for that product or system. If accepted, an equivalent results in no change to the contract amount. The Architect/Engineer's decision is the final authority regarding whether a product is equivalent or not.

B. Substitution: A product or system proposed for substitution, after the award of contract, whose components or characteristics differ from the specified criteria for that product or system. If accepted, a substitution may result in a change to the contract amount. Substitutions will only be accepted in the event that products or systems are discontinued.

C. Prospective bidders are advised that whenever specific brands, manufacturers, materials, or equipment are referenced in the Specifications, they are regarded as the required standard of quality and are presumed to be equal. The bidder may select one of the specified items or, if the bidder desires, they may use an equivalent type, brand, manufacturer, material, or equipment other than those named in the specification. When selecting to use an equivalent product or material not specified, the bidder shall submit, prior to the award of contract, the kind, type, brand and/or manufacturer included in the base bid. The bidder is further required to provide information, describing in specific detail, how the bid material differs from the quality and performance required by the base specifications, and other pertinent information as may be required by the Architect/Engineer or the Owner.

D. The successful bidder shall submit within ten (10) calendar days after opening of bids, and prior to award of contract, the kind, type, brand, manufacturer, or equipment included in the base bid. Equivalent products must be highlighted on this list. When requested, the successful bidder shall also submit information, describing in specific detail, how the equivalent bid material differs from the appearance, quality and performance required by the base specification.

E. The risk of whether bid equivalents will be accepted is borne by the Bidder.

F. No substitutions will be considered after the Contract award unless specifically provided in the Contract Documents. Refer to Section 01 60 00 for further information.

3.4 ADDENDA

A. No interpretation of the meaning of the Bidding Documents will be made to any bidder orally. Every request for such interpretation should be made in writing addressed to the Architect/Engineer:

Arcadis
59-61 Court Street, Suite 300
Binghamton, New York 13901

B. Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Construction Manager at least five (5) business days prior to the date for receipt of Bids. Questions received less than five (5) business days before the date for receipt of bids will not be answered.

C. Addenda will be mailed or delivered to all that are known by the Construction Manager to have received a complete set of Bidding Documents.

D. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

E. No Addenda will be issued later than three business days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

F. Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

G. Failure of any bidder to receive any such addendum shall not relieve any bidder from any obligation under their bid as submitted. All addenda so issued shall become a part of the Contract Documents.

4 PART 4 BIDDING PROCEDURES

4.1 PREPARATION OF BIDS

A. Bids must be submitted on forms identical to the form included with the Bidding Documents. All blank spaces must be filled in, in ink or typewritten, in both words and figures where so indicated. In the case of discrepancy between the two, the amount written in words shall govern.

B. Bidders are required to bid on all alternates that are indicated within the bidding documents. Bidders shall set forth in the space provided the amount to be added to or deducted from the BASE BID. If the Bidder does not desire to make a change from the Base Bid, they shall so indicate by using the words "NO CHANGE".

C. Alternate proposals will not be considered except as indicated on the Bid Form.

D. Erasures or other changes in the bid form must be explained or noted over the signature of the Bidder.

E. Each copy of the Bid shall include the legal name of the Bidder and shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

4.2 BID SECURITY

A. Each bid must be accompanied by Bid Bond using AIA Document A310, Certified Check, or Cashier's Check payable to the Owner in the amount of five percent (5%) percent of the base bid proposal.

B. Such Bid Bond, Certified Check, or Cashier's Check will be returned to all except the two lowest formal Bidders within seven (7) calendar days after the formal opening of the Bids. The remaining security will be returned to the two lowest Bidders within forty-eight (48) hours after the Owner and the accepted bidder have executed the Contract or, if no contract has been so executed, within forty-five (45) calendar days after formal bid opening, so long as bidder has not been notified of the acceptance of their proposal.

4.3 SUBMISSION OF BIDS

A. One (1) copy of the Bid Form shall be submitted with each bid. Second copy of Bid Form normally furnished should be retained for Bidder's own records.

B. All copies of the Bid, the bid security, and other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

C. Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned.

D. The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

4.4 MODIFICATION OR WITHDRAWAL OF BID

A. Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder or by telegram; if by telegram, written confirmation over the signature of the Bidder shall be mailed and postmarked on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

B. Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with the bidding requirements.

5 PART 5 CONSIDERATION OF BIDS

5.1 OPENING OF BIDS

A. Bids will be opened at the time and place set forth in the Invitation to Bid. Every bid received before that time, or authorized postponement thereof, will be opened and publicly read aloud.

5.2 REJECTION OF BIDS

A. The Owner shall have the right to reject any or all Bids, reject a Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or reject a Bid, which is in any way incomplete or irregular.

B. No bidder may withdraw a bid within forty-five (45) calendar days after the time and date set forth for receipt of bids.

5.3 ACCEPTANCE OF BID (AWARD)

A. It is the intent of the Owner to award a Contract to the lowest responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities or irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.

B. The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

6 PART 6 POST BID INFORMATION

6.1 DRAWINGS AND SPECIFICATIONS FURNISHED

A. Copies for Construction: Each Contractor will be furnished without charge up to two (2) sets of Contract Drawings and Project Manuals for use during construction for their own use and the use of their subcontractors. Additional sets will be provided at the cost of printing, postage, and handling. Partial sets will NOT be provided.

6.2 CONTRACTOR'S QUALIFICATION STATEMENT

A. Bidders to whom award of a Contract is under consideration shall submit, if required, to the Architect/Engineer and/or Construction Manager, upon request, a properly executed AIA Document A305, Contractor's Qualification Statement.

6.3 SUBMITTALS

A. The Bidder shall, within ten (10) calendar days after notification of selection for the award of a Contract, furnish to the Owner through the Construction Manager in writing:

1. A designation of the Work to be performed with the Bidder's own forces.

2. Names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the work.

3. Names of persons or entities (including those who are to furnish material or equipment fabricated to a special design) proposed for their portions of the Work.

B. The Bidder will be required to establish to the satisfaction of the Construction Manager and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

C. Prior to the award of the Contract, the Construction Manager will notify the Bidder in writing if either the Owner or Construction Manager, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Construction Manager has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, (1) withdraw the Bid, or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

D. Persons and entities proposed by the Bidder and to whom the Owner and Construction Manager have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Construction Manager.

7 PART 7 PERFORMANCE BOND AND PAYMENT BOND

7.1 BOND REQUIREMENTS

A. As a condition precedent to the execution of the contract, the Contractor shall furnish a bond in a sum of one hundred percent (100%) of the contract sum as security for the faithful performance of this contract (Performance Bond) and a bond in a sum of one hundred percent (100%) of the contract sum as security for the payment of all persons performing labor on the project and furnishing materials in connection with this project (Payment Bond).

B. Only Bonds that carry an AX, or better rating, as determined by the Best Rating Guide, will be acceptable on the project.

C. Bond shall be executed on AIA Document No. A312, "Performance Bond" and "Payment Bond", 2010 Edition, with amounts shown on each part. Surety shall be a company licensed to do business in the State of New York.

D. Attorneys in fact who sign bid bonds or contract bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

E. The bidder shall be held strictly accountable for the completion of this work on the specified schedule as a condition to satisfactory contract performance.

7.2 FAILURE TO ENTER INTO CONTRACT

A. The successful bidder, upon its failure or refusal to execute and deliver the contract, bond, and other bidding requirements required within fourteen (14) calendar days after the bidder has received notice of acceptance of its bid, shall forfeit to the Owner, the security deposited with its proposal or the difference between its bid and the next lowest responsible bid, whichever sum is greater.

8 PART 8 COMPLIANCE WITH GOVERNING AGENCIES

8.1 PERMITS, TAXES, AND ASSESSMENTS

A. The Contractor, in submitting a bid for this Contract, shall include in their Base Bid all costs and liabilities for permits. The Owner shall provide building permit. They shall also include within their Base Bid taxes and assessments upon the wages and salaries paid to employees of the Contractor and their subcontractors under the Contract, or any other taxes which may be assessed by the Federal, State or Local governments except as noted herein.

B. The Owner is exempt from payment of sales and compensating use taxes of the State of New York and of all cities and counties, and the Contractor shall notify all Subcontractors and material suppliers to this effect so the Bid, the Contract Sum, and subsequent requisitions for payment will not include any amount for sales or use taxes. All Contractors are referred to the General Conditions of the Contract for Construction and the Supplementary General Conditions of the Contract.

8.2 LAWS AND REGULATIONS

A. The bidder's attention is directed to the fact that all applicable Federal, State, or other Laws, orders, Rules and Regulations of all Authorities having jurisdiction over construction work in the locality 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.

B. These construction documents, and the joint and several phases of construction hereby contemplated are to be governed, at all times, by applicable provisions of the Federal and New York State law(s), including but not limited to the latest amendments of the following:

Williams-Steiger Occupational Safety & Health Act of 1970, Public Law 910596.

Part 1910 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations

Page 1518 - Safety and Health Regulations for Construction Chapter XIII of Title 29, Code of Federal Regulations.

NY CLS Labor § 220-h (2008), Labor Law, Article 8. Public Work, where the total cost of all work to be performed under the contract is at least two hundred fifty thousand dollars, all laborers, workers, and mechanics employed in the performance of the contract on the public work site, either by the contractor, sub-contractor or other person doing or contracting to do the whole or a part of the work contemplated by the contract, shall be certified prior to performing any work on the project 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 hours in duration.

8.3 NON-COLLUSIVE BIDDING CERTIFICATION

A. Pursuant to the requirements of Section 103-d of the General Municipal Law, each proposal submitted shall be accompanied by a fully executed Non-Collusive Bidding Certification, a copy of which is attached to the Bid Form.

8.4 NON-SEGREGATED FACILITIES CERTIFICATION

A. Notice of Requirement for Certification of Non-Segregated Facilities - Bidders are cautioned as follows: By signing this bid, the bidder will be deemed to have agreed to the provisions of the "Certification of Non-Segregated Facilities", a copy of which is enclosed hereafter. The Certification provides that the bidder does not maintain or provide for their employee’s facilities which are segregated on a basis of race, creed, color, or national origin, whether such facilities are segregated by directive or on a de facto basis. The Certification also provides that they will not maintain such segregated facilities. Failure of a bidder to agree to the Certification of Non-Segregated Facilities will render their bid non-responsive to the terms of solicitation involving awards of contracts

exceeding $10,000.00, which are not exempt from the provisions of the Equal Opportunity Clause.

8.5 ASSIGNMENT OF CONTRACT

A. The successful bidder is prohibited from assigning, transferring, conveying, subletting, or otherwise disposing of the same, or their right, title, or interest therein, or of their power to execute such contract to any other person or corporation without the previous consent in writing of the Owner. If such assignment, transfer conveyance, subletting, or otherwise, is made without the required consent of the Owner, the Contract herein shall be revoked, and annulled in accordance with Section 109 of the General Municipal Law, which is incorporated herein.

8.6 GENERAL COVERAGE CLAUSE

A. Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to have been inserted herein, and if through mistake or otherwise, such provision is not inserted, then upon the application of either party, this Contract shall be physically amended forthwith to make such insertion.

8.7 NON-WAIVER

A. No waiver of any breach of any condition in this agreement shall be binding unless the same shall be in writing and signed by the party waiving the said breach. No such waiver shall in any way affect any other term or condition of this agreement or constitute a cause or excuse for the repetition of such or any other breach unless the waiver shall include the same.

8.8 MODIFICATIONS OF AGREEMENT

A. This agreement constitutes the complete understanding of the parties, no modification or any provision thereof shall be valid unless in writing and signed by both parties.

9 PART 9 SPECIAL INSTRUCTIONS

9.1 CONTRACT BREAKDOWN

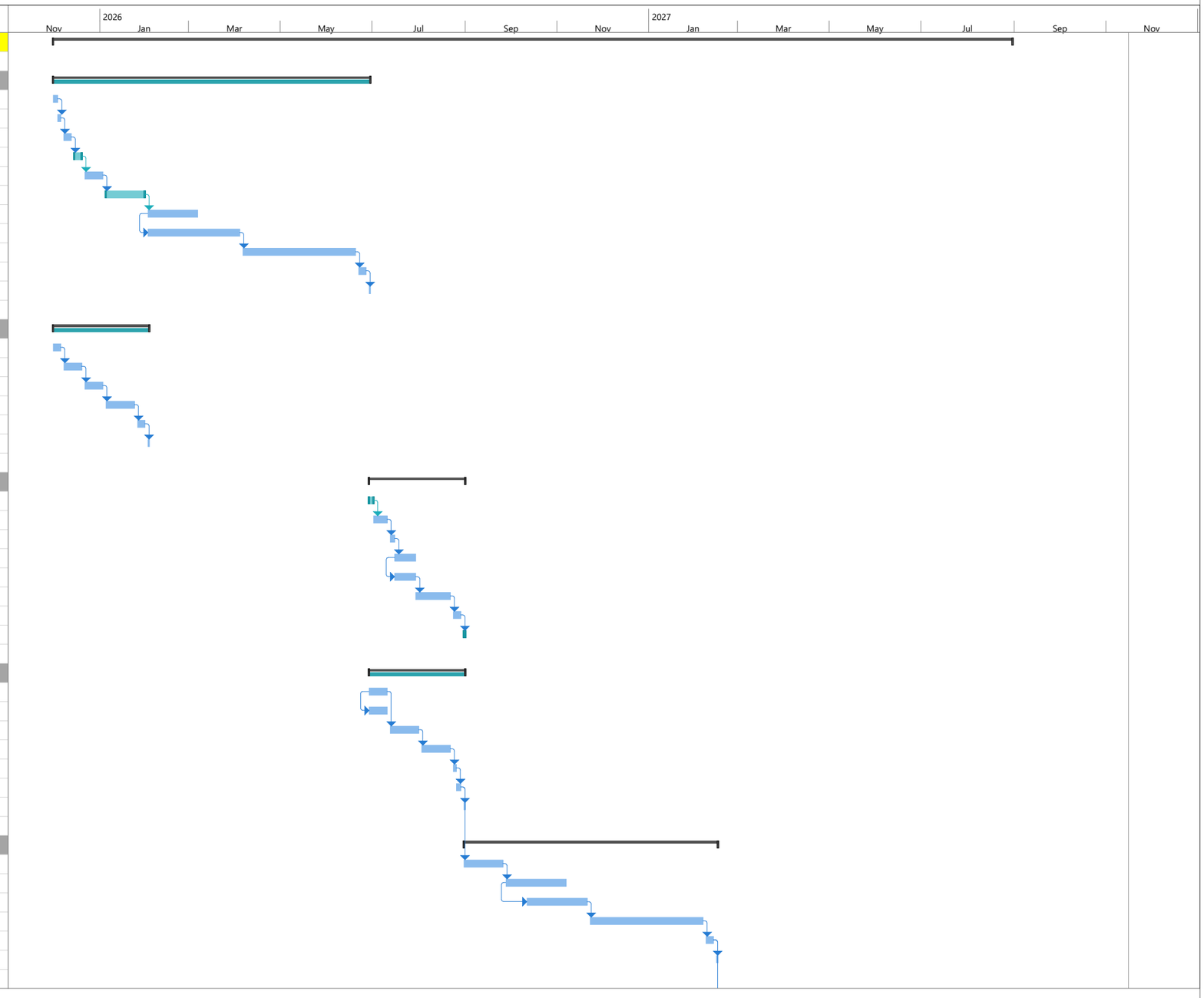
A. Each bidder shall furnish a breakdown of costs as indicated on Bid Form.

B. Successful bidders for each contract shall be required to submit a Schedule of Values indicating contract amount broken down by materials and labor and submit monthly requisitions in this format.

END OF DOCUMENT

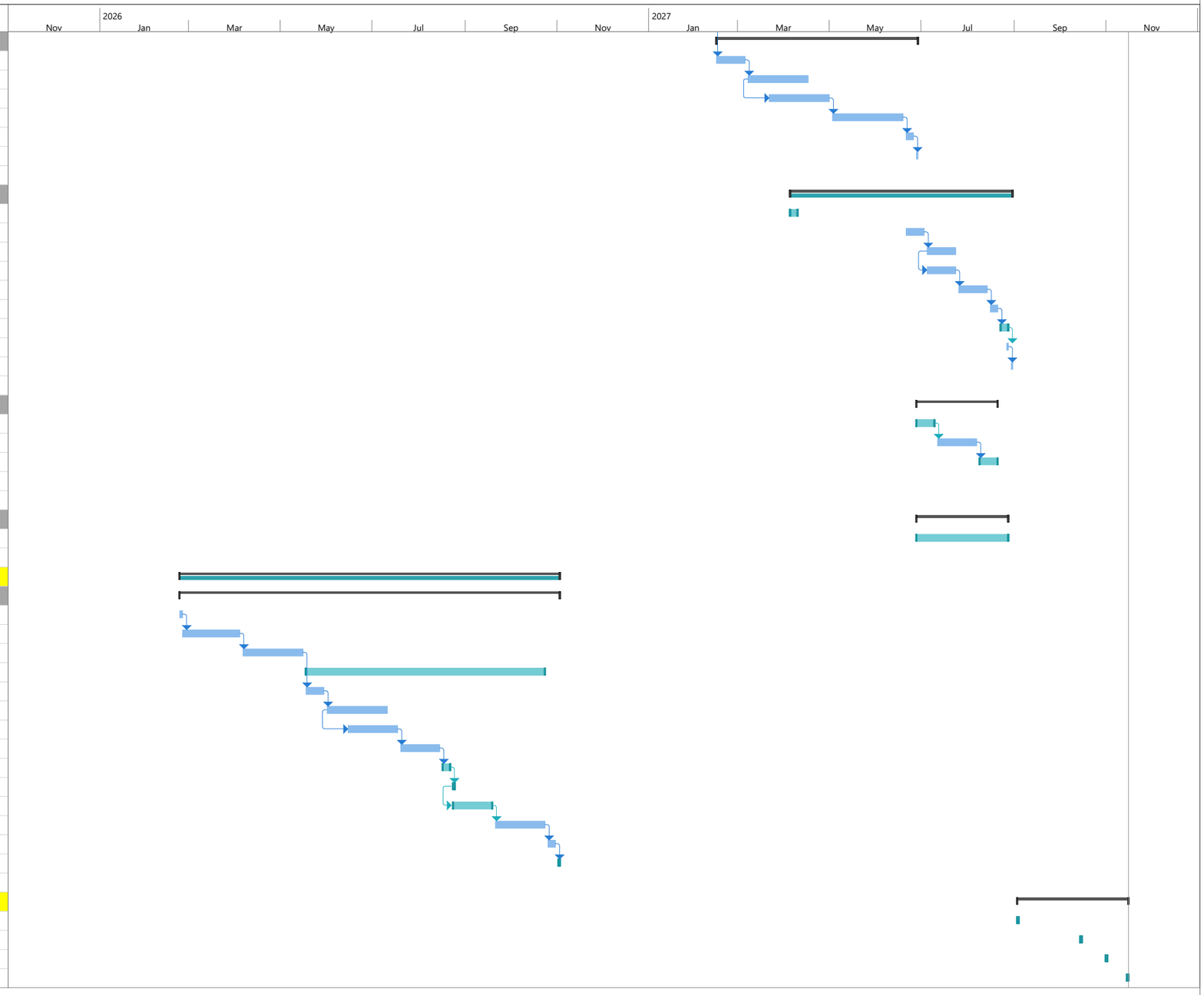
ODESSA-MONTOUR CSD
CAPITAL IMPROVEMENT PROJECT
PHASE II & III MILESTONE SCHEDULE

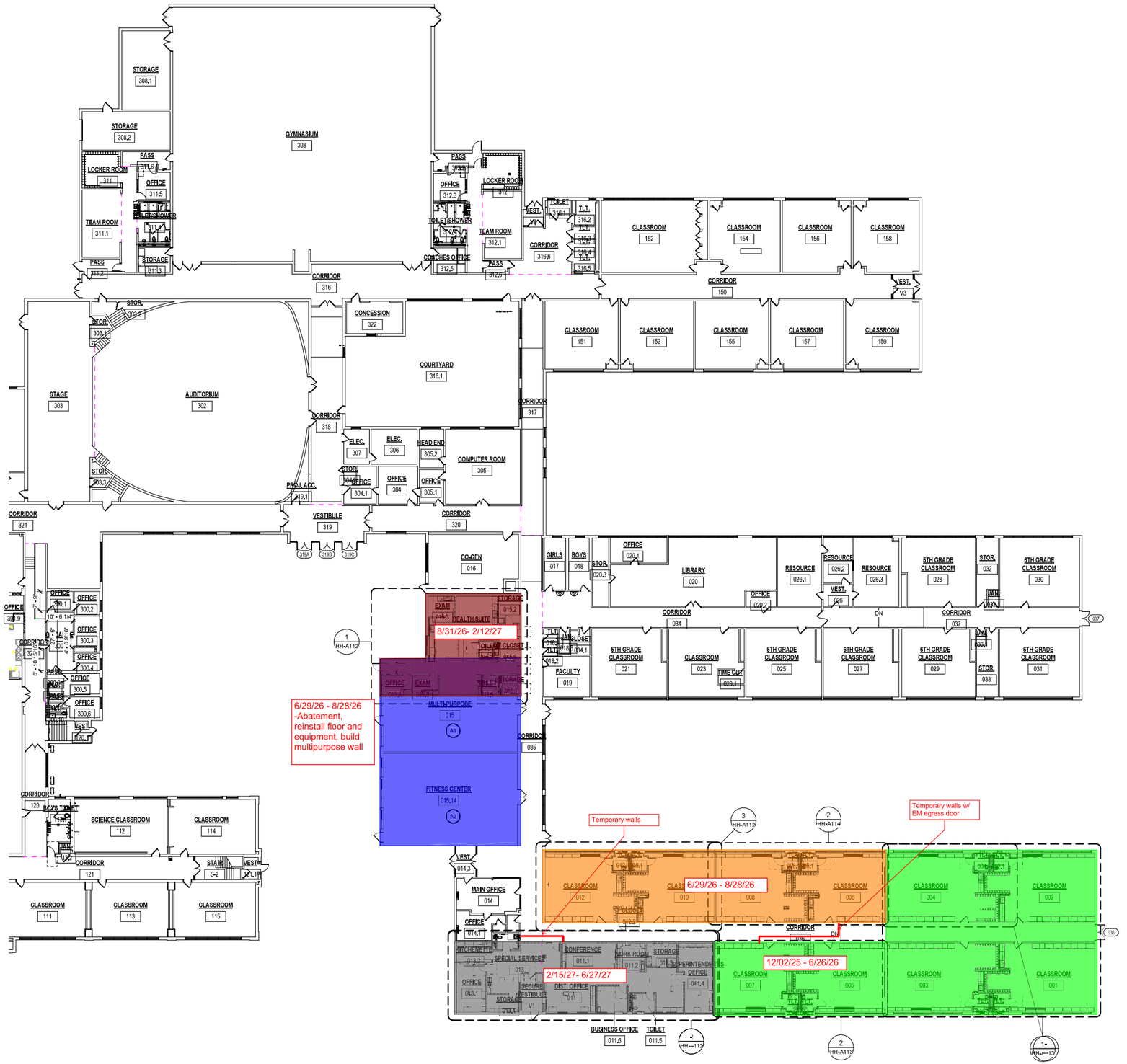
ID	Task Name	Duration	Start	Finish
1	**HS/HANLON ELEMENTARY**	**456 days**	**Mon 12/1/25**	**Mon 8/30/27**
2				
3	**Classroom Renovations (RM 001-004, 005, 007)**	**151 days**	**Mon 12/1/25**	**Mon 6/29/26**
4	Mobilize/Install Site Fence	3 days	Mon 12/1/25	Wed 12/3/25
5	Install Construction Partition (Second Shift)	2 days	Thu 12/4/25	Fri 12/5/25
6	Light Demo Prior to Asbestos Abatement	5 days	Mon 12/8/25	Fri 12/12/25
7	Classroom Asbestos Abatement Prep/Containments	5 days	Mon 12/15/25	Fri 12/19/25
8	Classroom Asbestos Abatement Removals (Winter Break)	10 days	Mon 12/22/25	Fri 1/2/26
9	Remaining Demolition	20 days	Mon 1/5/26	Fri 1/30/26
10	Masonry Partitions	25 days	Mon 2/2/26	Fri 3/6/26
11	MEP Rough-Ins	45 days	Mon 2/2/26	Fri 4/3/26
12	Interior Finishes	55 days	Mon 4/6/26	Fri 6/19/26
13	Punchlist/Final Clean	5 days	Mon 6/22/26	Fri 6/26/26
14	Owner Occupy	1 day	Mon 6/29/26	Mon 6/29/26
15				
16	**Hanlon Crawlspace Abatement & Encapsulate**	**46 days**	**Mon 12/1/25**	**Mon 2/2/26**
17	Exterior Wall Opening	5 days	Mon 12/1/25	Fri 12/5/25
18	Prep/Build Containments	10 days	Mon 12/8/25	Fri 12/19/25
19	Asbestos Removals (Winter Break)	10 days	Mon 12/22/25	Fri 1/2/26
20	Install EPDM Membrane	15 days	Mon 1/5/26	Fri 1/23/26
21	Punchlist/Final Inspection	5 days	Mon 1/26/26	Fri 1/30/26
22	Owner Occupy	1 day	Mon 2/2/26	Mon 2/2/26
23				
24	**Classroom Renovations (RM 006, 008, 010 & 012)**	**46 days**	**Mon 6/29/26**	**Mon 8/31/26**
25	Light Demo Prior to Asbestos Abatement	3 days	Mon 6/29/26	Wed 7/1/26
26	Asbestos Abatement	7 days	Thu 7/2/26	Fri 7/10/26
27	Remaining Demolition	3 days	Mon 7/13/26	Wed 7/15/26
28	Masonry Partitions	10 days	Thu 7/16/26	Wed 7/29/26
29	MEP Rough-Ins	10 days	Thu 7/16/26	Wed 7/29/26
30	Interior Finishes	17 days	Thu 7/30/26	Fri 8/21/26
31	Punchlist/Final Clean	5 days	Mon 8/24/26	Fri 8/28/26
32	Owner Occupy	1 day	Mon 8/31/26	Mon 8/31/26
33				
34	**Fitness Center/Multipurpose RM**	**46 days**	**Mon 6/29/26**	**Mon 8/31/26**
35	Remove/Salvage Rubber Floor	10 days	Mon 6/29/26	Fri 7/10/26
36	Demo Folding Partition	10 days	Mon 6/29/26	Fri 7/10/26
37	Asbestos Abatement (Poured Floor over 9x9)	15 days	Mon 7/13/26	Fri 7/31/26
38	Install Masonry Wall between MPR and Health Office Suit	15 days	Mon 8/3/26	Fri 8/21/26
39	Reinstall Fitness Center Rubber Floor (Rolls)	2 days	Mon 8/24/26	Tue 8/25/26
40	Punchlist/Final Clean	3 days	Wed 8/26/26	Fri 8/28/26
41	Owner Occupy	1 day	Mon 8/31/26	Mon 8/31/26
42				
43	**Health Office Suite Renovation**	**121 days**	**Mon 8/31/26**	**Mon 2/15/27**
44	Demolition	20 days	Mon 8/31/26	Fri 9/25/26
45	MEP Rough-Ins	30 days	Mon 9/28/26	Fri 11/6/26
46	Masonry Partitions	30 days	Mon 10/12/26	Fri 11/20/26
47	Interior Finishes	55 days	Mon 11/23/26	Fri 2/5/27
48	Punchlist/Final Clean	5 days	Mon 2/8/27	Fri 2/12/27
49	Owner Occupy	1 day	Mon 2/15/27	Mon 2/15/27
50				



ODESSA-MONTOUR CSD
CAPITAL IMPROVEMENT PROJECT
PHASE II & III MILESTONE SCHEDULE

ID	Task Name	Duration	Start	Finish
51	**District Office Renovation**	**96 days**	**Mon 2/15/27**	**Mon 6/28/27**
52	Demolition	15 days	Mon 2/15/27	Fri 3/5/27
53	MEP Rough-Ins	30 days	Mon 3/8/27	Fri 4/16/27
54	Masonry Partitions	30 days	Mon 3/22/27	Fri 4/30/27
55	Interior Finishes	35 days	Mon 5/3/27	Fri 6/18/27
56	Punchlist/Final Clean	5 days	Mon 6/21/27	Fri 6/25/27
57	Owner Occupy	1 day	Mon 6/28/27	Mon 6/28/27
58				
59	**Kitchen Renovation**	**106 days**	**Mon 4/5/27**	**Mon 8/30/27**
60	Cafeteria Soffit Abatement (Spring Break)	5 days	Mon 4/5/27	Fri 4/9/27
61	Demolition	10 days	Mon 6/21/27	Fri 7/2/27
62	MEP Rough-Ins	15 days	Mon 7/5/27	Fri 7/23/27
63	Masonry Partitions	15 days	Mon 7/5/27	Fri 7/23/27
64	Interior Finishes	15 days	Mon 7/26/27	Fri 8/13/27
65	Install Equipment	5 days	Mon 8/16/27	Fri 8/20/27
66	Punchlist/Final Clean	5 days	Mon 8/23/27	Fri 8/27/27
67	DOH Inspection	1 day	Fri 8/27/27	Fri 8/27/27
68	Owner Occupy	1 day	Mon 8/30/27	Mon 8/30/27
69				
70	**Guidance Office HVAC (ALT)**	**40 days**	**Mon 6/28/27**	**Fri 8/20/27**
71	Demolition	10 days	Mon 6/28/27	Fri 7/9/27
72	MEP Rough-Ins	20 days	Mon 7/12/27	Fri 8/6/27
73	Interior Finishes	10 days	Mon 8/9/27	Fri 8/20/27
74				
75				
76	**Main Entrance Sitework**	**45 days**	**Mon 6/28/27**	**Fri 8/27/27**
77	Sitework	45 days	Mon 6/28/27	Fri 8/27/27
78				
79	**BUS GARAGE**	**181 days**	**Mon 2/23/26**	**Mon 11/2/26**
80	**Bus Garage**	**181 days**	**Mon 2/23/26**	**Mon 11/2/26**
81	Mobilize/Install Site Fence	2 days	Mon 2/23/26	Tue 2/24/26
82	Demolition	28 days	Wed 2/25/26	Fri 4/3/26
83	Structural Reinforcement/Roof Steel	30 days	Mon 4/6/26	Fri 5/15/26
84	Sitework	115 days	Mon 5/18/26	Fri 10/23/26
85	Roofing/Envelope Dry-In	10 days	Mon 5/18/26	Fri 5/29/26
86	MEP Rough-Ins	30 days	Mon 6/1/26	Fri 7/10/26
87	Masonry Partitions	25 days	Mon 6/15/26	Fri 7/17/26
88	Interior/Exterior Finishes	20 days	Mon 7/20/26	Fri 8/14/26
89	Training RM, Toilet RMs, Office Punchlist/Final Clean	5 days	Mon 8/17/26	Fri 8/21/26
90	Training RM, Toilet RMs, Office Owner Occupy	1 day	Mon 8/24/26	Mon 8/24/26
91	Bus Lift Installation (Structural Concrete 28-Day Min)	20 days	Mon 8/24/26	Fri 9/18/26
92	Remaining Interior Finishes	25 days	Mon 9/21/26	Fri 10/23/26
93	Punchlist/Final Clean	5 days	Mon 10/26/26	Fri 10/30/26
94	Owner Occupy	1 day	Mon 11/2/26	Mon 11/2/26
95	~~<New Task>~~			
96	**CLOSEOUT**	**52 days**	**Fri 9/3/27**	**Mon 11/15/27**
97	Substantial Completion	1 day	Fri 9/3/27	Fri 9/3/27
98	Punchlist Completion	1 day	Fri 10/15/27	Fri 10/15/27
99	O&M/As-Built Completion	1 day	Mon 11/1/27	Mon 11/1/27
100	Final Pay Applications/Final Close	1 day	Mon 11/15/27	Mon 11/15/27





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CLIENT

ODESSA-MONTOUR CENTRAL SCHOOL DISTRICT

300 COLLEGE AVENUE,
ODESSA NEW YORK
14869

COPYRIGHT

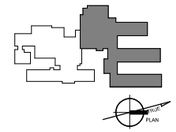
This drawing has been prepared solely for the intended use, thus any reproduction or unauthorized use of this drawing is prohibited. Do not scale drawings. Written dimensions shall have precedence over scaled dimensions. Contractor shall verify and be responsible for all dimensions and conditions on the job, and Arcadis shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to Arcadis for general conformance before proceeding with fabrication.

ARCADIS ARCHITECTS, ENGINEERS, & LANDSCAPE ARCHITECTS
is a member of the Arcadis Group of companies

ISSUES

ISSUE	ISSUANCE	DATE

KEYPLAN



CONSULTANTS

SEAL

EXPIRATION DATE: 02-28-2027

PRIME CONSULTANT

ARCADIS ARCHITECTS, ENGINEERS AND LANDSCAPE ARCHITECTS
ARCADIS
6-41 Court Street, Suite 300,
Binghamton, NY 13901-1956, USA
tel:607 772 0007 fax 607 723 4121
arcadis.com

PROJECT

2023 CAPITAL IMPROVEMENTS - PHASE 2

ODESSA ELEMENTARY & HIGH SCHOOL
300 COLLEGE AVENUE, ODESSA, NEW YORK 13869

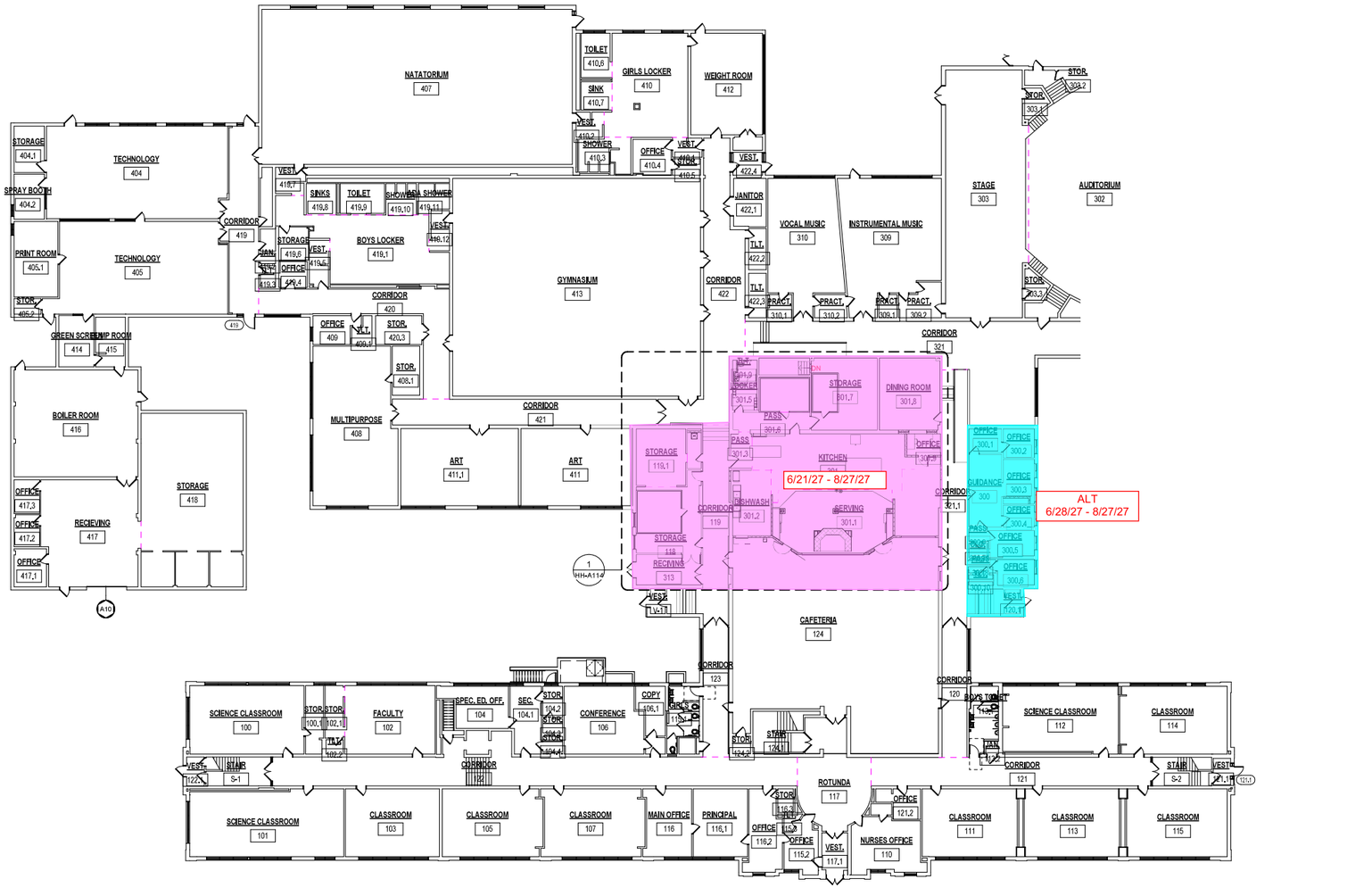
PROJECT NO:	CLIENT PROJECT NO:
143500	55-01-01-04-0-001-022
DRAWN BY: DG	CHECKED BY: DG
PROJECT MGR: SMT	APPROVED BY: SMT
SCALE: As indicated	DATE: 2025-02-28

SHEET TITLE:
OVERALL FIRST FLOOR RENOVATION PLAN - AREA B

SHEET NUMBER: HH-A111

ISSUE

Autodesk Docs://143500-Odessa/Arch/_CSD143500-OMCSD_2023_C.rvt



1 HH-A110 FIRST FLOOR RENOVATION PLAN - AREA A
Scale: 1/16" = 1'-0"

CLIENT
ODESSA-MONTOUR CENTRAL SCHOOL DISTRICT
300 COLLEGE AVENUE,
ODESSA NEW YORK
14869

COPYRIGHT
This drawing has been prepared solely for the intended use, thus any reproduction or publication of this drawing is prohibited. Do not scale drawings. Written dimensions shall have precedence over scaled dimensions. Contractor shall verify and be responsible for all dimensions and conditions on the job, and Arcadis shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to Arcadis for general conformance before proceeding with fabrication.
ARCADIS ARCHITECTS, ENGINEERS, & LANDSCAPE ARCHITECTS is a member of the Arcadis Group of companies

ISSUES

ISSUE	ISSUANCE	DATE

KEYPLAN

CONSULTANTS

SEAL
REGISTERED ARCHITECT JOHN MICHAEL PIERCE STATE OF NEW YORK
EXPIRATION DATE: 02-28-2027

PRIME CONSULTANT
ARCADIS ARCHITECTS, ENGINEERS AND LANDSCAPE ARCHITECTS
ARCADIS 49-51 Court Street, Suite 300, Binghamton, NY 13901-1506, USA
tel 607 772 0007 fax 607 723 4121
arcadis.com

PROJECT
2023 CAPITAL IMPROVEMENTS - PHASE 2
ODESSA ELEMENTARY & HIGH SCHOOL
300 COLLEGE AVENUE, ODESSA, NEW YORK 13869

PROJECT NO:	CLIENT PROJECT NO:
143500	55-01-01-04-0-001-022
DRAWN BY: DG	CHECKED BY: DG
PROJECT MGR: SMT	APPROVED BY: SMT
SCALE: As indicated	DATE: 2025-02-28

SHEET TITLE
OVERALL FIRST FLOOR RENOVATION PLAN - PART A

SHEET NUMBER HH-A110 ISSUE

HALF INCH 1/2in

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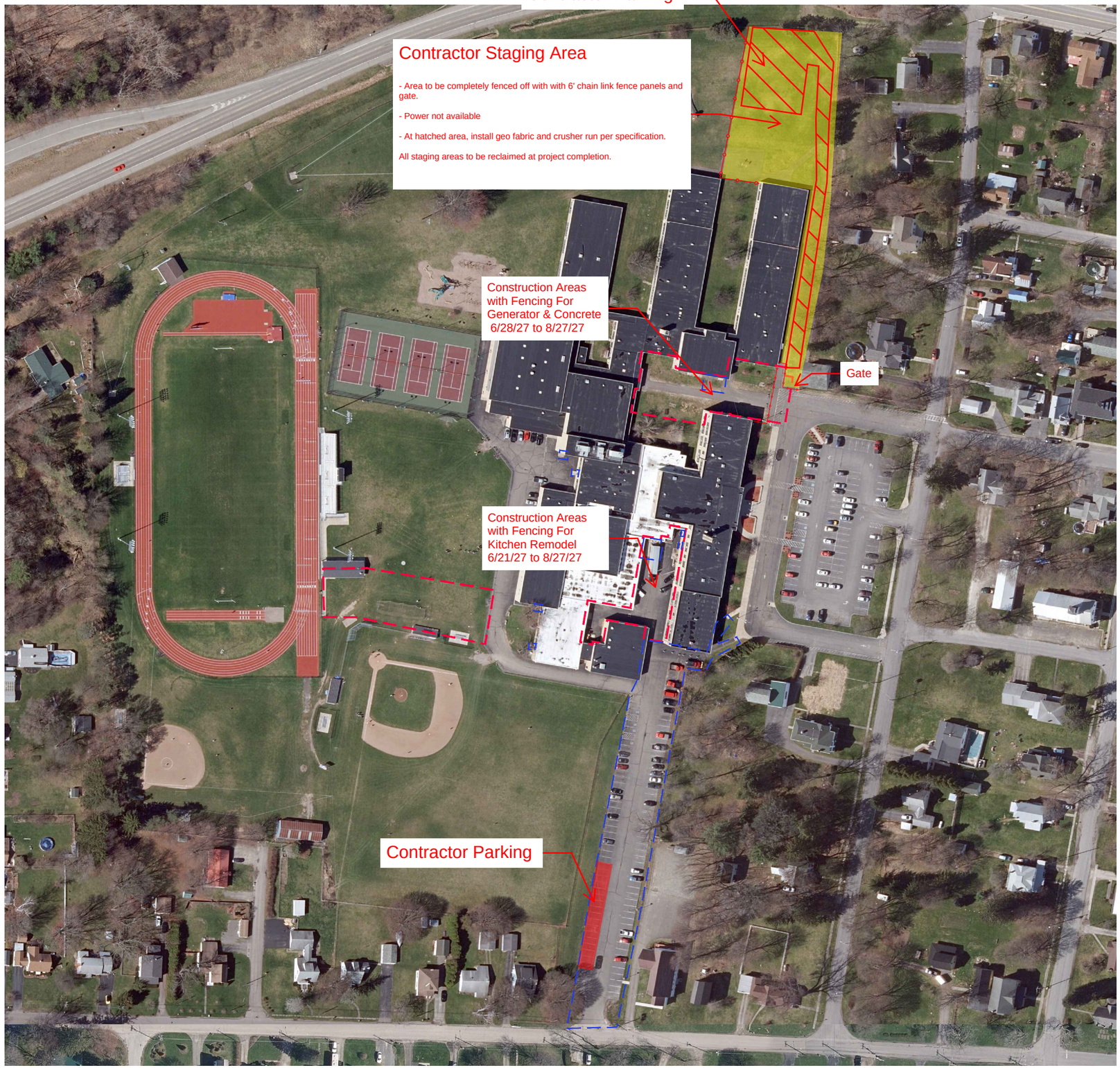
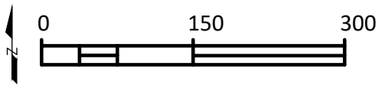

Contractor Parking
Contractor Staging Area
- Area to be completely fenced off with with 6' chain link fence panels and gate.
- Power not available
- At hatched area, install geo fabric and crusher run per specification.
All staging areas to be reclaimed at project completion.
Construction Areas with Fencing For Generator & Concrete 6/28/27 to 8/27/27
Gate
Construction Areas with Fencing For Kitchen Remodel 6/21/27 to 8/27/27
Contractor Parking


0
150
300
N

ARCADIS

10'x40'Temporary Office Trailer w/ toilet for Bus Garage Personnel, provided and maintained by GC. 2/23/26 - 6/26/26
Contractor Staging Area
-Area to be completely fenced off with gate.
- Power not available
2/23/26 - 10/30/26
United States • NY • Schuyler Co. • Odessa
State Route 228
228
State Route 224
224
State Route 224
Feedback
50 ft
20 m
© 2025 TomTom, © OpenStreetMap, © Vexcel Imaging

DOCUMENT 00 31 00

INFORMATION AVAILABLE TO BIDDERS

1.1 SUMMARY

A. Document Includes:

1. Lead survey report.

2. Asbestos test report.

3. Crystalline Silica OSHA information

1.2 LEAD SURVEY

A. The presence of lead has been detected in identified work areas. A Summary Analysis Report, including confirmed positives (greater than or equal to 1.0 mg/cm2) is available for viewing upon request to the Owner.

B. Lead Based Paint Hazard: All structural steel, unless specifically stated otherwise, is assumed to be painted with lead-based paint or primer. Whenever cutting, torching, welding, grinding or heating structural steel is specified the contractor is responsible for compliance related to lead-based paint in accordance with OSHA standards. OSHA 1926.62 Lead applies. OSHA Instruction TED 01-00-015 [TED 1-0.1A] (Section V: Chapter 3) provides technical guidance for Controlling Lead Exposures in the Construction Industry: Engineering and Work-Place Controls. OSHA also provides instruction by Directive Number STD-03-08-001 titled Welding, Cutting or Heating of Metals Coated with Lead-Bearing Paint.

1.3 ASBESTOS TEST REPORT

A. The presence of asbestos has been detected in identified work areas. A Summary Analysis Report, including confirmed positives (>1.0%) is available for viewing upon request to the Owner.

1.4 PCB TEST REPORT

A. The presence of PCB's has not been detected in identified work areas. The Summary Analysis Report including confirmed positives is attached to this document.

1.5 CRYSTALLINE SILICA OSHA INFORMATION

A. Assume all concrete, brick, mortar, and masonry materials contain crystalline silica.

B. U.S. Department of Labor Occupational Safety and Health Administration (OSHA) standard 29 CFR 1926.1153 requires employers to limit worker exposures to respirable silica.

C. OSHA provides compliance guidance for worker protection from silica dust hazards for Small Entities at: https://www.osha.gov/Publications/OSHA3902.pdf.

D. Information of OSHA's Respirable Crystalline Silica Standard for Construction is available at: https://www.osha.gov/Publications/OSHA3681.pdf

E. The OSHA Standard and guidelines indicate the use of engineering controls, work practices and procedures to limit the exposure to silica dust including but not limited to wet methods, HEPA filtration for tools and equipment (saws, blades, drills, jack hammers, chipping, grinding, cutting, etc.)

F. The OSHA standard also requires medical monitoring, a respiratory protection program, a written exposure plan, a designated competent person, worker training and record keeping for workers silica exposure.

END OF DOCUMENT

BID FORM - CONTRACT NO. 1
GENERAL CONSTRUCTION

DOCUMENT 00 41 00

BID FORM – GENERAL CONSTRUCTION

TO: Odessa-Montour CSD

PROJECT: 2023 Capital Improvements Project Phase 2

In accordance with Documents 00 21 13 - Instructions to Bidders and 00 31 00 - Information Available to Bidders, and in compliance with the proposed Contract Documents for the construction of the referenced project, please be advised that:

The Undersigned _____
(Name of Contractor)

_____
(Address)

having examined the Bidding Documents as prepared by Arcadis, having visited the site, and having familiarized themselves with the local conditions and any other conditions affecting the work of this Project, including the availability of materials and labor, hereby agrees to execute a contract to furnish all labor, materials, equipment, transportation, and services necessary to perform and complete the construction of the Project in accordance with the Contract Documents within the time limit, for the sums given as follows:

BASE BID – CONTRACT NO. 1 - GENERAL CONSTRUCTION

The construction and completion of all labor, material, equipment, services and related items incidental to and necessary to complete satisfactorily the work as shown on the Bidding Documents for the total lump sum of *(which includes the Allowance(s) noted in Specification Section 01 21 00 – Price and Payment Procedures)*:

_____(Dollars)_____(Figures)

ADDENDA

Receipt of the following addenda are hereby acknowledged and the work of the same are hereby included in the sum of the Base Bid and/or Alternate:

Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____

BID BOND

Enclosed is a Bid Bond, Certified Check, Cashier's Check in the amount of

_____

Dollars ($_____), made payable to the Owner, and the Undersigned agrees that in case of failure to execute the necessary Contract and furnish the required Performance Bond and Payment Bond within the time limit set forth, the Bid Bond, Certified Check, or Cashier's Check, shall become and remain the property of the Owner as liquidated damages for the delay and additional expense caused the Owner thereby.

GENERAL AGREEMENTS

The sum given within this Bid is based upon the following general agreements:

1. The sum given in the Base Bid represents the entire cost of the Project. The sum given shall include any and all cost for insurance, including all insurance required by the Agreement, any and all fees for licenses and permits. The Undersigned agrees that no claim will be made for any additional costs regardless of any increases in costs such as higher wage scales or material prices. No amount is included in the Base Bid for sales or use taxes on materials and supplies to be incorporated in the work, except as specified.

2. The Undersigned has carefully checked all the figures used in compiling the sum given in the Base Bid and understands that the Owner will not be responsible for any errors or omissions incurred by the Undersigned in making up of this bid. The Undersigned further understands that no modification or withdrawal of this proposal will be permitted after the time specified for the receipt of bids.

3. The Undersigned agrees that this Bid shall be good and may not be withdrawn for a period of forty-five (45) consecutive calendar days after the time specified for the receipt of bids.

4. The Undersigned agrees to furnish the performance bond and payment bond as specified prior to the execution of the Contract.

5. The Undersigned hereby agrees to commence work under this Contract within ten (10) working days of receipt of "Notice to Proceed".

6. The Undersigned hereby agrees that on or before the date indicated in the Instructions to Bidders, they shall have substantially completed all the work of the Contract Documents as specified and that within Fifteen (15) working days from the date of substantial completion, they shall have fully completed the work of the total Contract as specified.

7. The undersigned agrees to provide the Owner with a breakdown of project costs for informational purposes only, prior to award of contract.

Dated: _____, 2025 Signed _____

For _____
(Name of Company)

Street _____

City _____

State _____

Zip _____

Telephone _____

NON-COLLUSIVE BIDDING CERTIFICATION

TO: Odessa-Montour CSD

HEREINAFTER REFERRED TO AS THE OWNER, IN ACCORDANCE WITH SEALED BIDS FOR:

2023 Capital Improvements Project Phase 2

SUBMITTED UNDER DATE OF:_____

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 hereto certifies as to its own organization, under penalty of perjury, that to the best of 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.

COMPANY:_____

BY:_____

CERTIFICATION OF NON-SEGREGATED FACILITIES

By the submission of this bid, the bidder, offeror, or subcontractor certifies that they do not maintain or provide for their employees any segregated facilities at any of their establishments, and that they do not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. They certify further that they will not maintain or provide for their employees any segregated facilities at any of their establishments, and that they will not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The bidder, offeror, applicant or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms, restaurants, and other eating area, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. They further agree that (except where they have obtained identical certifications from proposed subcontractors for specific time periods) they will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000.00; that they will retain such certifications in their files; and that they will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTE: The penalty for making false statement in offers is prescribed in 18 U.S.C. 1001.

_____
Name and Title of Signer
(Please Type)

_____
(Signature)

_____
(Date)

CERTIFICATION

I, _____, the _____ of _____
(Name) (Title) (Name of Company)

hereby swear or affirm that the following is true:

1. The company, its principles or entities related to the company named above, is not now, nor ever has been, debarred from contracting with the United States Government or any State government.

2. The company is not now under investigation by any agency of the Federal Government or the government of any State for any actions by the company, its principles or any related entity, for any alleged malfeasance or misfeasance of any kind or nature which could lead to a debarment from governmental contracting or criminal prosecution, as well as render any contracts signed in reliance on this certification voidable by the party relying on this certification.

3. I have full legal authority under my company's organizational documents or bylaws to make this certification on the company's behalf.

4. I understand that submission of a false statement on this document will subject me to criminal prosecution.

Dated: _____ _____
Signature

IRAN DIVESTMENT ACT CERTIFICATION

As a result of the Iran Divestment Act of 2012 (Act), Chapter 1 of the 2012 Laws of New York, a new provision has been added to the State Finance Law (SFL), § 165-a, effective April 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list (prohibited entities list) of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law). 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, Bidder/Contractor (or any assignee) certifies that once the prohibited entities list is posted on the OGS website, it will not utilize on such Contract any subcontractor that is identified on the prohibited entities list.

Additionally, Bidder/Contractor is advised that once the list is posted on the OGS website, any Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to the 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 New York State Education Department (AGENCY) receive information that a person is in violation of the above-referenced certification, AGENCY will offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then AGENCY shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages, or declaring the Contractor in default.

AGENCY reserves the right to reject any bid or request for assignment for an entity that appears on the prohibited entities list prior to the award of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the prohibited entities list after contract award.

Signature:_____

Print Name:_____

Title:_____

Company Name:_____

Date: :_____

Attach to each copy of the Bid Form a Bid Bond using AIA Document A310, a certified check, or a cashier's check payable to the Owner. Any Bid Bond on other forms may be considered an irregularity in bidding. AIA forms as required by these Contract Documents are available from the American Institute of Architects, 1735 New York Avenue, NW, Washington, DC 20006, or from the Architect's office at cost.

BID FORM - CONTRACT NO. 2
MECHANICAL CONSTRUCTION

DOCUMENT 00 41 00

BID FORM – MECHANICAL CONSTRUCTION

TO: Odessa-Montour CSD

PROJECT: 2023 Capital Improvements Project Phase 2

In accordance with Documents 00 21 13 - Instructions to Bidders and 00 31 00 - Information Available to Bidders, and in compliance with the proposed Contract Documents for the construction of the referenced project, please be advised that:

The Undersigned _____
(Name of Contractor)

_____
(Address)

having examined the Bidding Documents as prepared by Arcadis, having visited the site, and having familiarized themselves with the local conditions and any other conditions affecting the work of this Project, including the availability of materials and labor, hereby agrees to execute a contract to furnish all labor, materials, equipment, transportation, and services necessary to perform and complete the construction of the Project in accordance with the Contract Documents within the time limit, for the sums given as follows:

BASE BID – CONTRACT NO. 2 - MECHANICAL CONSTRUCTION

The construction and completion of all labor, material, equipment, services and related items incidental to and necessary to complete satisfactorily the work as shown on the Bidding Documents for the total lump sum of *(which includes the Allowance(s) noted in Specification Section 01 21 00 – Price and Payment Procedures)*:

_____(Dollars)_____(Figures)

ADDENDA

Receipt of the following addenda are hereby acknowledged and the work of the same are hereby included in the sum of the Base Bid and/or Alternate:

Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____

BID BOND

Enclosed is a Bid Bond, Certified Check, Cashier's Check in the amount of

_____

Dollars ($_____), made payable to the Owner, and the Undersigned agrees that in case of failure to execute the necessary Contract and furnish the required Performance Bond and Payment Bond within the time limit set forth, the Bid Bond, Certified Check, or Cashier's Check, shall become and remain the property of the Owner as liquidated damages for the delay and additional expense caused the Owner thereby.

GENERAL AGREEMENTS

The sum given within this Bid is based upon the following general agreements:

1. The sum given in the Base Bid represents the entire cost of the Project. The sum given shall include any and all cost for insurance, including all insurance required by the Agreement, any and all fees for licenses and permits. The Undersigned agrees that no claim will be made for any additional costs regardless of any increases in costs such as higher wage scales or material prices. No amount is included in the Base Bid for sales or use taxes on materials and supplies to be incorporated in the work, except as specified.

2. The Undersigned has carefully checked all the figures used in compiling the sum given in the Base Bid and understands that the Owner will not be responsible for any errors or omissions incurred by the Undersigned in making up of this bid. The Undersigned further understands that no modification or withdrawal of this proposal will be permitted after the time specified for the receipt of bids.

3. The Undersigned agrees that this Bid shall be good and may not be withdrawn for a period of forty-five (45) consecutive calendar days after the time specified for the receipt of bids.

4. The Undersigned agrees to furnish the performance bond and payment bond as specified prior to the execution of the Contract.

5. The Undersigned hereby agrees to commence work under this Contract within ten (10) working days of receipt of "Notice to Proceed".

6. The Undersigned hereby agrees that on or before the date indicated in the Instructions to Bidders, they shall have substantially completed all the work of the Contract Documents as specified and that within Fifteen (15) working days from the date of substantial completion, they shall have fully completed the work of the total Contract as specified.

7. The undersigned agrees to provide the Owner with a breakdown of project costs for informational purposes only, prior to award of contract.

Dated: _____, 2025 Signed _____

For _____
(Name of Company)

Street _____

City _____

State _____

Zip _____

Telephone _____

NON-COLLUSIVE BIDDING CERTIFICATION

TO: Odessa-Montour CSD

HEREINAFTER REFERRED TO AS THE OWNER, IN ACCORDANCE WITH SEALED BIDS FOR:

2023 Capital Improvements Project Phase 2

SUBMITTED UNDER DATE OF:_____

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 hereto certifies as to its own organization, under penalty of perjury, that to the best of 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.

COMPANY:_____

BY:_____

CERTIFICATION OF NON-SEGREGATED FACILITIES

By the submission of this bid, the bidder, offeror, or subcontractor certifies that they do not maintain or provide for their employees any segregated facilities at any of their establishments, and that they do not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. They certify further that they will not maintain or provide for their employees any segregated facilities at any of their establishments, and that they will not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The bidder, offeror, applicant or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms, restaurants, and other eating area, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. They further agree that (except where they have obtained identical certifications from proposed subcontractors for specific time periods) they will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000.00; that they will retain such certifications in their files; and that they will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTE: The penalty for making false statement in offers is prescribed in 18 U.S.C. 1001.

_____
Name and Title of Signer
(Please Type)

_____
(Signature)

_____
(Date)

CERTIFICATION

I, _____, the _____ of _____
(Name) (Title) (Name of Company)

hereby swear or affirm that the following is true:

1. The company, its principles or entities related to the company named above, is not now, nor ever has been, debarred from contracting with the United States Government or any State government.

2. The company is not now under investigation by any agency of the Federal Government or the government of any State for any actions by the company, its principles or any related entity, for any alleged malfeasance or misfeasance of any kind or nature which could lead to a debarment from governmental contracting or criminal prosecution, as well as render any contracts signed in reliance on this certification voidable by the party relying on this certification.

3. I have full legal authority under my company's organizational documents or bylaws to make this certification on the company's behalf.

4. I understand that submission of a false statement on this document will subject me to criminal prosecution.

Dated: _____ _____
Signature

IRAN DIVESTMENT ACT CERTIFICATION

As a result of the Iran Divestment Act of 2012 (Act), Chapter 1 of the 2012 Laws of New York, a new provision has been added to the State Finance Law (SFL), § 165-a, effective April 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list (prohibited entities list) of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law). 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.

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

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AGENCY reserves the right to reject any bid or request for assignment for an entity that appears on the prohibited entities list prior to the award of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the prohibited entities list after contract award.

Signature:_____

Print Name:_____

Title:_____

Company Name:_____

Date: :_____

Attach to each copy of the Bid Form a Bid Bond using AIA Document A310, a certified check, or a cashier's check payable to the Owner. Any Bid Bond on other forms may be considered an irregularity in bidding. AIA forms as required by these Contract Documents are available from the American Institute of Architects, 1735 New York Avenue, NW, Washington, DC 20006, or from the Architect's office at cost.

BID FORM - CONTRACT NO. 3
ELECTRICAL CONSTRUCTION

DOCUMENT 00 41 00

BID FORM – ELECTRICAL CONSTRUCTION

TO: Odessa-Montour CSD

PROJECT: 2023 Capital Improvements Project Phase 2

In accordance with Documents 00 21 13 - Instructions to Bidders and 00 31 00 - Information Available to Bidders, and in compliance with the proposed Contract Documents for the construction of the referenced project, please be advised that:

The Undersigned _____
(Name of Contractor)

_____
(Address)

having examined the Bidding Documents as prepared by Arcadis, having visited the site, and having familiarized themselves with the local conditions and any other conditions affecting the work of this Project, including the availability of materials and labor, hereby agrees to execute a contract to furnish all labor, materials, equipment, transportation, and services necessary to perform and complete the construction of the Project in accordance with the Contract Documents within the time limit, for the sums given as follows:

BASE BID – CONTRACT NO. 3 - ELECTRICAL CONSTRUCTION

The construction and completion of all labor, material, equipment, services and related items incidental to and necessary to complete satisfactorily the work as shown on the Bidding Documents for the total lump sum of *(which includes the Allowance(s) noted in Specification Section 01 21 00 – Price and Payment Procedures)*:

_____(Dollars)_____(Figures)

ADDENDA

Receipt of the following addenda are hereby acknowledged and the work of the same are hereby included in the sum of the Base Bid and/or Alternate:

Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____

BID BOND

Enclosed is a Bid Bond, Certified Check, Cashier's Check in the amount of

_____

Dollars ($_____), made payable to the Owner, and the Undersigned agrees that in case of failure to execute the necessary Contract and furnish the required Performance Bond and Payment Bond within the time limit set forth, the Bid Bond, Certified Check, or Cashier's Check, shall become and remain the property of the Owner as liquidated damages for the delay and additional expense caused the Owner thereby.

GENERAL AGREEMENTS

The sum given within this Bid is based upon the following general agreements:

1. The sum given in the Base Bid represents the entire cost of the Project. The sum given shall include any and all cost for insurance, including all insurance required by the Agreement, any and all fees for licenses and permits. The Undersigned agrees that no claim will be made for any additional costs regardless of any increases in costs such as higher wage scales or material prices. No amount is included in the Base Bid for sales or use taxes on materials and supplies to be incorporated in the work, except as specified.

2. The Undersigned has carefully checked all the figures used in compiling the sum given in the Base Bid and understands that the Owner will not be responsible for any errors or omissions incurred by the Undersigned in making up of this bid. The Undersigned further understands that no modification or withdrawal of this proposal will be permitted after the time specified for the receipt of bids.

3. The Undersigned agrees that this Bid shall be good and may not be withdrawn for a period of forty-five (45) consecutive calendar days after the time specified for the receipt of bids.

4. The Undersigned agrees to furnish the performance bond and payment bond as specified prior to the execution of the Contract.

5. The Undersigned hereby agrees to commence work under this Contract within ten (10) working days of receipt of "Notice to Proceed".

6. The Undersigned hereby agrees that on or before the date indicated in the Instructions to Bidders, they shall have substantially completed all the work of the Contract Documents as specified and that within Fifteen (15) working days from the date of substantial completion, they shall have fully completed the work of the total Contract as specified.

7. The undersigned agrees to provide the Owner with a breakdown of project costs for informational purposes only, prior to award of contract.

Dated: _____, 2025 Signed _____

For _____
(Name of Company)

Street _____

City _____

State _____

Zip _____

Telephone _____

NON-COLLUSIVE BIDDING CERTIFICATION

TO: Odessa-Montour CSD

HEREINAFTER REFERRED TO AS THE OWNER, IN ACCORDANCE WITH SEALED BIDS FOR:

2023 Capital Improvements Project Phase 2

SUBMITTED UNDER DATE OF:_____

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 hereto certifies as to its own organization, under penalty of perjury, that to the best of 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.

COMPANY:_____

BY:_____

CERTIFICATION OF NON-SEGREGATED FACILITIES

By the submission of this bid, the bidder, offeror, or subcontractor certifies that they do not maintain or provide for their employees any segregated facilities at any of their establishments, and that they do not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. They certify further that they will not maintain or provide for their employees any segregated facilities at any of their establishments, and that they will not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The bidder, offeror, applicant or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms, restaurants, and other eating area, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. They further agree that (except where they have obtained identical certifications from proposed subcontractors for specific time periods) they will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000.00; that they will retain such certifications in their files; and that they will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTE: The penalty for making false statement in offers is prescribed in 18 U.S.C. 1001.

_____
Name and Title of Signer
(Please Type)

_____
(Signature)

_____
(Date)

CERTIFICATION

I, _____, the _____ of _____
(Name) (Title) (Name of Company)

hereby swear or affirm that the following is true:

1. The company, its principles or entities related to the company named above, is not now, nor ever has been, debarred from contracting with the United States Government or any State government.

2. The company is not now under investigation by any agency of the Federal Government or the government of any State for any actions by the company, its principles or any related entity, for any alleged malfeasance or misfeasance of any kind or nature which could lead to a debarment from governmental contracting or criminal prosecution, as well as render any contracts signed in reliance on this certification voidable by the party relying on this certification.

3. I have full legal authority under my company's organizational documents or bylaws to make this certification on the company's behalf.

4. I understand that submission of a false statement on this document will subject me to criminal prosecution.

Dated: _____ _____
Signature

IRAN DIVESTMENT ACT CERTIFICATION

As a result of the Iran Divestment Act of 2012 (Act), Chapter 1 of the 2012 Laws of New York, a new provision has been added to the State Finance Law (SFL), § 165-a, effective April 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list (prohibited entities list) of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law). 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, Bidder/Contractor (or any assignee) certifies that once the prohibited entities list is posted on the OGS website, it will not utilize on such Contract any subcontractor that is identified on the prohibited entities list.

Additionally, Bidder/Contractor is advised that once the list is posted on the OGS website, any Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to the 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 New York State Education Department (AGENCY) receive information that a person is in violation of the above-referenced certification, AGENCY will offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then AGENCY shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages, or declaring the Contractor in default.

AGENCY reserves the right to reject any bid or request for assignment for an entity that appears on the prohibited entities list prior to the award of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the prohibited entities list after contract award.

Signature:_____

Print Name:_____

Title:_____

Company Name:_____

Date: :_____

Attach to each copy of the Bid Form a Bid Bond using AIA Document A310, a certified check, or a cashier's check payable to the Owner. Any Bid Bond on other forms may be considered an irregularity in bidding. AIA forms as required by these Contract Documents are available from the American Institute of Architects, 1735 New York Avenue, NW, Washington, DC 20006, or from the Architect's office at cost.

BID FORM - CONTRACT NO. 4
PLUMBING CONSTRUCTION

DOCUMENT 00 41 00

BID FORM – PLUMBING CONSTRUCTION

TO: Odessa-Montour CSD

PROJECT: 2023 Capital Improvements Project Phase 2

In accordance with Documents 00 21 13 - Instructions to Bidders and 00 31 00 - Information Available to Bidders, and in compliance with the proposed Contract Documents for the construction of the referenced project, please be advised that:

The Undersigned _____
(Name of Contractor)

_____
(Address)

having examined the Bidding Documents as prepared by Arcadis, having visited the site, and having familiarized themselves with the local conditions and any other conditions affecting the work of this Project, including the availability of materials and labor, hereby agrees to execute a contract to furnish all labor, materials, equipment, transportation, and services necessary to perform and complete the construction of the Project in accordance with the Contract Documents within the time limit, for the sums given as follows:

BASE BID – CONTRACT NO. 4 - PLUMBING CONSTRUCTION

The construction and completion of all labor, material, equipment, services and related items incidental to and necessary to complete satisfactorily the work as shown on the Bidding Documents for the total lump sum of *(which includes the Allowance(s) noted in Specification Section 01 21 00 – Price and Payment Procedures)*:

_____(Dollars)_____(Figures)

ADDENDA

Receipt of the following addenda are hereby acknowledged and the work of the same are hereby included in the sum of the Base Bid and/or Alternate:

Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____

BID BOND

Enclosed is a Bid Bond, Certified Check, Cashier's Check in the amount of

_____

Dollars ($_____), made payable to the Owner, and the Undersigned agrees that in case of failure to execute the necessary Contract and furnish the required Performance Bond and Payment Bond within the time limit set forth, the Bid Bond, Certified Check, or Cashier's Check, shall become and remain the property of the Owner as liquidated damages for the delay and additional expense caused the Owner thereby.

GENERAL AGREEMENTS

The sum given within this Bid is based upon the following general agreements:

1. The sum given in the Base Bid represents the entire cost of the Project. The sum given shall include any and all cost for insurance, including all insurance required by the Agreement, any and all fees for licenses and permits. The Undersigned agrees that no claim will be made for any additional costs regardless of any increases in costs such as higher wage scales or material prices. No amount is included in the Base Bid for sales or use taxes on materials and supplies to be incorporated in the work, except as specified.

2. The Undersigned has carefully checked all the figures used in compiling the sum given in the Base Bid and understands that the Owner will not be responsible for any errors or omissions incurred by the Undersigned in making up of this bid. The Undersigned further understands that no modification or withdrawal of this proposal will be permitted after the time specified for the receipt of bids.

3. The Undersigned agrees that this Bid shall be good and may not be withdrawn for a period of forty-five (45) consecutive calendar days after the time specified for the receipt of bids.

4. The Undersigned agrees to furnish the performance bond and payment bond as specified prior to the execution of the Contract.

5. The Undersigned hereby agrees to commence work under this Contract within ten (10) working days of receipt of "Notice to Proceed".

6. The Undersigned hereby agrees that on or before the date indicated in the Instructions to Bidders, they shall have substantially completed all the work of the Contract Documents as specified and that within Fifteen (15) working days from the date of substantial completion, they shall have fully completed the work of the total Contract as specified.

7. The undersigned agrees to provide the Owner with a breakdown of project costs for informational purposes only, prior to award of contract.

Dated: _____, 2025 Signed _____

For _____
(Name of Company)

Street _____

City _____

State _____

Zip _____

Telephone _____

NON-COLLUSIVE BIDDING CERTIFICATION

TO: Odessa-Montour CSD

HEREINAFTER REFERRED TO AS THE OWNER, IN ACCORDANCE WITH SEALED BIDS FOR:

2023 Capital Improvements Project Phase 2

SUBMITTED UNDER DATE OF:_____

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 hereto certifies as to its own organization, under penalty of perjury, that to the best of 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.

COMPANY:_____

BY:_____

CERTIFICATION OF NON-SEGREGATED FACILITIES

By the submission of this bid, the bidder, offeror, or subcontractor certifies that they do not maintain or provide for their employees any segregated facilities at any of their establishments, and that they do not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. They certify further that they will not maintain or provide for their employees any segregated facilities at any of their establishments, and that they will not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The bidder, offeror, applicant or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms, restaurants, and other eating area, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. They further agree that (except where they have obtained identical certifications from proposed subcontractors for specific time periods) they will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000.00; that they will retain such certifications in their files; and that they will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTE: The penalty for making false statement in offers is prescribed in 18 U.S.C. 1001.

_____
Name and Title of Signer
(Please Type)

_____
(Signature)

_____
(Date)

CERTIFICATION

I, _____, the _____ of _____
(Name) (Title) (Name of Company)

hereby swear or affirm that the following is true:

1. The company, its principles or entities related to the company named above, is not now, nor ever has been, debarred from contracting with the United States Government or any State government.

2. The company is not now under investigation by any agency of the Federal Government or the government of any State for any actions by the company, its principles or any related entity, for any alleged malfeasance or misfeasance of any kind or nature which could lead to a debarment from governmental contracting or criminal prosecution, as well as render any contracts signed in reliance on this certification voidable by the party relying on this certification.

3. I have full legal authority under my company's organizational documents or bylaws to make this certification on the company's behalf.

4. I understand that submission of a false statement on this document will subject me to criminal prosecution.

Dated: _____ _____
Signature

IRAN DIVESTMENT ACT CERTIFICATION

As a result of the Iran Divestment Act of 2012 (Act), Chapter 1 of the 2012 Laws of New York, a new provision has been added to the State Finance Law (SFL), § 165-a, effective April 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list (prohibited entities list) of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law). 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, Bidder/Contractor (or any assignee) certifies that once the prohibited entities list is posted on the OGS website, it will not utilize on such Contract any subcontractor that is identified on the prohibited entities list.

Additionally, Bidder/Contractor is advised that once the list is posted on the OGS website, any Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to the 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 New York State Education Department (AGENCY) receive information that a person is in violation of the above-referenced certification, AGENCY will offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then AGENCY shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages, or declaring the Contractor in default.

AGENCY reserves the right to reject any bid or request for assignment for an entity that appears on the prohibited entities list prior to the award of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the prohibited entities list after contract award.

Signature:_____

Print Name:_____

Title:_____

Company Name:_____

Date: :_____

Attach to each copy of the Bid Form a Bid Bond using AIA Document A310, a certified check, or a cashier's check payable to the Owner. Any Bid Bond on other forms may be considered an irregularity in bidding. AIA forms as required by these Contract Documents are available from the American Institute of Architects, 1735 New York Avenue, NW, Washington, DC 20006, or from the Architect's office at cost.

BID FORM - CONTRACT NO. 5
FOOD SERVICE CONSTRUCTION

DOCUMENT 00 41 00

BID FORM – FOOD SERVICE CONSTRUCTION

TO: Odessa-Montour CSD

PROJECT: 2023 Capital Improvements Project Phase 2

In accordance with Documents 00 21 13 - Instructions to Bidders and 00 31 00 - Information Available to Bidders, and in compliance with the proposed Contract Documents for the construction of the referenced project, please be advised that:

The Undersigned _____
(Name of Contractor)

_____
(Address)

having examined the Bidding Documents as prepared by Arcadis, having visited the site, and having familiarized themselves with the local conditions and any other conditions affecting the work of this Project, including the availability of materials and labor, hereby agrees to execute a contract to furnish all labor, materials, equipment, transportation, and services necessary to perform and complete the construction of the Project in accordance with the Contract Documents within the time limit, for the sums given as follows:

BASE BID – CONTRACT NO. 5 – FOOD SERVICE CONSTRUCTION

The construction and completion of all labor, material, equipment, services and related items incidental to and necessary to complete satisfactorily the work as shown on the Bidding Documents for the total lump sum of *(which includes the Allowance(s) noted in Specification Section 01 21 00 – Price and Payment Procedures)*:

_____(Dollars)_____(Figures)

ADDENDA

Receipt of the following addenda are hereby acknowledged and the work of the same are hereby included in the sum of the Base Bid and/or Alternate:

Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____
Addendum No. _____Date_____

BID BOND

Enclosed is a Bid Bond, Certified Check, Cashier's Check in the amount of

_____

Dollars ($_____), made payable to the Owner, and the Undersigned agrees that in case of failure to execute the necessary Contract and furnish the required Performance Bond and Payment Bond within the time limit set forth, the Bid Bond, Certified Check, or Cashier's Check, shall become and remain the property of the Owner as liquidated damages for the delay and additional expense caused the Owner thereby.

GENERAL AGREEMENTS

The sum given within this Bid is based upon the following general agreements:

1. The sum given in the Base Bid represents the entire cost of the Project. The sum given shall include any and all cost for insurance, including all insurance required by the Agreement, any and all fees for licenses and permits. The Undersigned agrees that no claim will be made for any additional costs regardless of any increases in costs such as higher wage scales or material prices. No amount is included in the Base Bid for sales or use taxes on materials and supplies to be incorporated in the work, except as specified.

2. The Undersigned has carefully checked all the figures used in compiling the sum given in the Base Bid and understands that the Owner will not be responsible for any errors or omissions incurred by the Undersigned in making up of this bid. The Undersigned further understands that no modification or withdrawal of this proposal will be permitted after the time specified for the receipt of bids.

3. The Undersigned agrees that this Bid shall be good and may not be withdrawn for a period of forty-five (45) consecutive calendar days after the time specified for the receipt of bids.

4. The Undersigned agrees to furnish the performance bond and payment bond as specified prior to the execution of the Contract.

5. The Undersigned hereby agrees to commence work under this Contract within ten (10) working days of receipt of "Notice to Proceed".

6. The Undersigned hereby agrees that on or before the date indicated in the Instructions to Bidders, they shall have substantially completed all the work of the Contract Documents as specified and that within Fifteen (15) working days from the date of substantial completion, they shall have fully completed the work of the total Contract as specified.

7. The undersigned agrees to provide the Owner with a breakdown of project costs for informational purposes only, prior to award of contract.

Dated: _____, 2025 Signed _____

For _____
(Name of Company)

Street _____

City _____

State _____

Zip _____

Telephone _____

NON-COLLUSIVE BIDDING CERTIFICATION

TO: Odessa-Montour CSD

HEREINAFTER REFERRED TO AS THE OWNER, IN ACCORDANCE WITH SEALED BIDS FOR:

2023 Capital Improvements Project Phase 2

SUBMITTED UNDER DATE OF:_____

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 hereto certifies as to its own organization, under penalty of perjury, that to the best of 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.

COMPANY:_____

BY:_____

CERTIFICATION OF NON-SEGREGATED FACILITIES

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NOTE: The penalty for making false statement in offers is prescribed in 18 U.S.C. 1001.

_____
Name and Title of Signer
(Please Type)

_____
(Signature)

_____
(Date)

CERTIFICATION

I, _____, the _____ of _____
(Name) (Title) (Name of Company)

hereby swear or affirm that the following is true:

1. The company, its principles or entities related to the company named above, is not now, nor ever has been, debarred from contracting with the United States Government or any State government.

2. The company is not now under investigation by any agency of the Federal Government or the government of any State for any actions by the company, its principles or any related entity, for any alleged malfeasance or misfeasance of any kind or nature which could lead to a debarment from governmental contracting or criminal prosecution, as well as render any contracts signed in reliance on this certification voidable by the party relying on this certification.

3. I have full legal authority under my company's organizational documents or bylaws to make this certification on the company's behalf.

4. I understand that submission of a false statement on this document will subject me to criminal prosecution.

Dated: _____ _____
Signature

IRAN DIVESTMENT ACT CERTIFICATION

As a result of the Iran Divestment Act of 2012 (Act), Chapter 1 of the 2012 Laws of New York, a new provision has been added to the State Finance Law (SFL), § 165-a, effective April 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list (prohibited entities list) of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law). 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, Bidder/Contractor (or any assignee) certifies that once the prohibited entities list is posted on the OGS website, it will not utilize on such Contract any subcontractor that is identified on the prohibited entities list.

Additionally, Bidder/Contractor is advised that once the list is posted on the OGS website, any Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to the 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 New York State Education Department (AGENCY) receive information that a person is in violation of the above-referenced certification, AGENCY will offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then AGENCY shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages, or declaring the Contractor in default.

AGENCY reserves the right to reject any bid or request for assignment for an entity that appears on the prohibited entities list prior to the award of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the prohibited entities list after contract award.

Signature:_____

Print Name:_____

Title:_____

Company Name:_____

Date: :_____

Attach to each copy of the Bid Form a Bid Bond using AIA Document A310, a certified check, or a cashier's check payable to the Owner. Any Bid Bond on other forms may be considered an irregularity in bidding. AIA forms as required by these Contract Documents are available from the American Institute of Architects, 1735 New York Avenue, NW, Washington, DC 20006, or from the Architect's office at cost.

DOCUMENT 00 50 00

AGREEMENT FORMS

PART 1 NOTICE TO PROCEED

A. A "Notice to Proceed" will be sent in triplicate by the Owner to the successful bidder for signature. The date of this notice shall serve as the Contract Date for this project.

B. A copy of the Notice to Proceed is included in this section for informational purposes only.

PART 4 OWNER-CONTRACTOR AGREEMENT

A. The Form of Agreement to be entered into by the Owner and the Contractor for this project shall be the Standard Form of Agreement Between Owner and Contractor, Document A132 of the American Institute of Architects, 2019 Edition.

B. A copy of the Form of Agreement is included in this section for informational purposes only. Upon award of the contract to the respective qualified low Bidder, the actual Form of Agreement will be processed and forwarded to the Owner and Contractor for execution.

NOTICE TO PROCEED

Date:

Project: 2023 Capital Improvements Project Phase 2

Contract:

State Education Number(s): 55-01-01-04-0-001-022 – Odessa Elementary & High School
55-01-01-04-5-003-012 – Bus Garage

Architect's Project No.: 143500

To: [Contractor Name and Address]

Attn:

The above Contractor is hereby authorized to proceed with the _____ Contract, as outlined in the Bidding Documents, dated _____, and amended by Addendum (Addenda) No(s). [insert number], dated [insert date], for the Base Bid amount of $_____, [Contract amount of $_____, including the Base Bid amount of $_____, and accepted [Add/Deduct] Alternate No(s). [insert number] in the amount of $_____.].

The date of this notice shall serve as the CONTRACT DATE for this project. You are required under the terms of the bidding documents to start work within TEN WORKING DAYS, which includes the submission of your Certificates of Insurance ***to the Architect***. Work shall commence at the site upon receipt of Certificate of Insurance.

The following information must be submitted ***to the Architect*** within TEN WORKING DAYS from the receipt of this notice:

Performance Bond
Labor and Material Payment Bond
List of Subcontractors and Material Suppliers
Schedule of Values

Failure to comply with these requirements shall be cause to forfeit the Bid Security per Document 00 21 13, Paragraph 7.2, of the Specifications.

Please return one executed copy to the Owner, one ***to the Architect***, and retain the other for your records.

ISSUED BY: _____ DATE: _____
(OWNER NAME)

ACCEPTED BY: _____ DATE: _____
(CONTRACTOR NAME)

END OF DOCUMENT

DRAFT

AIA® Document A132™ – 2019

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

AGREEMENT made as of the « » day of « » in the year « Two Thousand Twenty-Five »
(In words, indicate day, month, and year.)

BETWEEN the Owner:
(Name, legal status, address, and other information)

«Odessa-Montour Central School District »« »
«300 College Avenue »
«Odessa, NY 14869 »

and the Contractor:
(Name, legal status, address, and other information)

« »« »
« »
« »
« »

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

«SED Nos. 55-01-01-04-0-001-022 – Odessa Elementary and High School
55-01-01-04-5-003-012 – Bus Garage »
«
Contract. No.
2023 Capital Improvements Project – Phase 2&3
Odessa-Montour Central School District
300 College Avenue
Odessa, NY 14869 »

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

«LeChase Construction Service, LLC »« »
«11849 East Corning Road »
«Corning, NY 14830 »

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

«Arcadis »« »
«59-61 Court Street, Suite 300 »
«Binghamton, NY 13901 »

The Owner and Contractor agree as follows.

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

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

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

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ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

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

[« X »] The date of this Agreement.

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

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

§ 3.3 Substantial Completion of the Project or Portions Thereof

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

«August 27, 2027 »

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

§ 3.4.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall substantially complete the entire Work of this Contract:
(Check one of the following boxes and complete the necessary information.)

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[« X »] By the following date: « August 27, 2027 »

ARTICLE 4 CONTRACT SUM

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

[« X »] Stipulated Sum, in accordance with Section 4.2 below
(Based on the selection above, complete Section 4.2, 4.3 or 4.4 below.)

§ 4.2 Stipulated Sum

§ 4.2.1 The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2.2 Alternates

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

Item	Price

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

Item	Price

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

Item	Units and Limitations	Price per Unit ($0.00)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

«Refer to Document 00 73 00 – Supplementary General Conditions of the Contract. »

§ 5.1.3 Provided that an Application for Payment is received by the Construction Manager not later than the « twenty-fifth » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « thirtieth » day of the « following » month. If an Application for Payment is received by the Construction Manager after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « forty-five » (« 45 ») days after the Construction Manager receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

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

§ 5.1.4.1 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

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§ 5.1.4.2 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.4.3 In accordance with AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.4.3.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.4.3.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to when the Work of this Contract is substantially complete, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

«Five percent (5%) »

§ 5.1.7.2 Except as set forth in this Section 5.1.7.2, when the Work of this Contract is substantially complete, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7.

§ 5.2 Final Payment

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

§ 5.2.1.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect.

§ 5.2.1.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

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

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§ 6.2 Binding Dispute Resolution
For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A232–2019, the method of binding dispute resolution shall be as follows:

[« X »] Litigation in a court of competent jurisdiction.

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

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

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

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

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

«Jim Nolan »
«Odessa-Montour Central School District »
«300 College Avenue »
«Odessa, NY 14869 »

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

« »
« »
« »
« »
« »
« »

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

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A132™–2019, Exhibit A, and elsewhere in the Contract Documents.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

.2 AIA Document A132™–2019, Exhibit A, Insurance and Bonds Exhibit

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.3 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition

.4 Drawings

Number	Title	Date
See Table of Contents		

.5 Specifications

Section	Title	Date	Pages
See Table of Contents			

.6 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.7 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« X »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
See Table of Contents			

.]'[; Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A232–2019 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

«1. Advertisement to Bid, dated October 1, 2025, shall become part of the Contract Documents.
2. Instructions to Bidders, dated September 29, 2025, shall become part of the Contract Documents.
3. Bid Form from _____, dated _____, shall become part of the Contract Documents. »

This Agreement is entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

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DOCUMENT 00 60 00

BONDS AND CERTIFICATES

PART 1 PERFORMANCE BOND AND PAYMENT BOND

A. As described in Document 00 21 13 - Information to Bidders, Part 7 Performance Bond and Payment Bond, each bidder shall submit a Performance Bond and Payment Bond in the amount of one hundred percent (100%) of the Contract Sum.

B. The bonds submitted shall be executed on AIA Document A312 "Performance Bond" and "Payment Bond", 2010 Edition.

C. Copies of these documents are included for informational purposes only. Prospective bidders may acquire copies of said documents from the office of the Architect for the actual cost of the documents as determined by the American Institute of Architects.

PART 2 CERTIFICATE OF INSURANCE

A. The acceptable Certificate of Insurance for this contract will be the ACORD Certificate of Insurance Form 25-S as enclosed in this section.

B. The contractor shall, upon execution of the Form of Agreement with the Owner, submit the Certificate of Insurance prior to commencement of work as described in Article 11 of the General Conditions.

C. The limits and types of liability, naming the Owner and project as insured are as shown on the attached forms.

PART 3 CONTRACTOR'S QUALIFICATION STATEMENT

A. After the receipt and opening of bids, and prior to the issuance of a notice to proceed and execution of a formal Owner/Contractor Agreement, the low bidder may be required to submit a completed Contractor's Qualification Statement on AIA Document A305.

B. A copy of the Qualification Statement to be used on this project is included for informational purposes only and may be purchased at the Architect's office. Upon award of the Contract to the respective qualified low Bidder(s) the actual Contractor's Qualification Statement(s) will be processed and forwarded to the respective parties for execution.

PART 4 ASBESTOS ABATEMENT LIABILITY INSURANCE (CONTRACT NO. 1)

A. Liability insurance shall include all major divisions of coverage and be a comprehensive basis including:
   1. Owner's and Contractor's Protective.

2. Products and Completed Operations.

3. Contractual - Including specified provisions for the Contractor's obligations.

4. Owned, Non-owned and Hired Motor Vehicles.

6. Broad Form Property Damage Including Completed Operations.

B. Minimum Insurance Limits:

1. Workers Compensation:
   a. State: Statutory.
   b. Applicable Federal (e.g. Longshoreman, harbor work, work at or outside U. S. Boundaries): Statutory.
   c. Maritime: NA.
   d. Employer's Liability: $100,000.
   e. Benefits Required by Union as Labor Contracts: Applicable.

2. The Contractor shall possess a valid Occurrence Based Asbestos Liability Insurance for this project.

3. Comprehensive General Asbestos Liability (Including Premises-Operations; Independent Contractor's Protective; Product and Completed Operations; Broad Form Property Damage):
   a. Bodily Injury:
      $1,000,000 Each Occurrence
      $1,000,000 Aggregate, Products and Completed Operations
   b. Property Damage:
      $1,000,000 Each Occurrence
      $5,000,000 Aggregate
   c. Products and Completed Operations Insurance shall be maintained for a minimum of, at the discretion of the Owner, one year after the final payment. Said Contractor shall continue to provide to the Owner on an annual basis WRITTEN EVIDENCE of this aforementioned insurance for the duration of the policy.
   d. Contractual Liability (Hold Harmless Coverage);
      1) Bodily Injury:
         $500,000 Each Occurrence
      2) Property Damage:
         $500,000 Each Occurrence
         $1,000,000 Aggregate
   e. Personal Injury, with Employment Exclusion deleted:
      $1,000,000 Aggregate

4. Comprehensive Automobile Liability (Owned, Non-owned, Hired):
   a. Bodily Injury:
      $500,000 Each Person
      $1,000,000 Each Accident

b. Property Damage:
$1,000,000 Each Occurrence

C. Before starting work on site, furnish one copy of each Certificate(s) of Insurance for each copy of Agreement, setting forth evidence of all coverage required.

The form of each Certificate of Insurance shall be ACORD Form 25-S (7/97) (non-simplified version). Furnish to the Owner copies of the endorsements that are subsequently issued amending coverage limits.

END OF DOCUMENT

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	**SURETY**
Company: *(Corporate Seal)*	Company: *(Corporate Seal)*
Signature: _____	Signature: _____
Name and Title:	Name and Title:

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

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

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

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

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

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

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

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

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

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

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

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

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

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

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

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User Notes: (810104627)

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

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

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

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

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

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

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

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

§ 14 Definitions

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

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

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

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

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

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

§ 16 Modifications to this bond are as follows:

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

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

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User Notes: (810104627)

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		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

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

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

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

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

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

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

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

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

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

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

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

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

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

.2 have sent a Claim to the Surety (at the address described in Section 13).

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

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

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

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

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

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

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

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

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User Notes: (1181710388)

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

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

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

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

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

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

§ 16 Definitions

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

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

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

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

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

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

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

§ 18 Modifications to this bond are as follows:

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

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:	_____	Signature:	_____
Name and Title:		Name and Title:	
Address:		Address:	

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CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
INSURED	INSURER A :	
	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$
	☐ CLAIMS-MADE ☐ OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$
	☐ POLICY ☐ PRO-JECT ☐ LOC						PRODUCTS - COMP/OP AGG	$
	☐ OTHER:							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	☐ ANY AUTO						BODILY INJURY (Per person)	$
	☐ OWNED AUTOS ONLY ☐ SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	☐ HIRED AUTOS ONLY ☐ NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
	☐ **UMBRELLA LIAB** ☐ OCCUR						EACH OCCURRENCE	$
	☐ **EXCESS LIAB** ☐ CLAIMS-MADE						AGGREGATE	$
	☐ DED ☐ RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N						☐ PER STATUTE ☐ OTH-ER	
	ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? ☐ **(Mandatory in NH)**	N / A					E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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AIA® Document A305® – 2020

Contractor's Qualification Statement

THE PARTIES SHOULD EXECUTE A SEPARATE CONFIDENTIALITY AGREEMENT IF THEY INTEND FOR ANY OF THE INFORMATION IN THIS A305-2020 TO BE HELD CONFIDENTIAL.

SUBMITTED BY:
(Organization name and address.)

SUBMITTED TO:
(Organization name and address.)

TYPE OF WORK TYPICALLY PERFORMED
(Indicate the type of work your organization typically performs, such as general contracting, construction manager as constructor services, HVAC contracting, electrical contracting, plumbing contracting, or other.)

THIS CONTRACTOR'S QUALIFICATION STATEMENT INCLUDES THE FOLLOWING:
(Check all that apply.)

[ ] Exhibit A – General Information
[ ] Exhibit B – Financial and Performance Information
[ ] Exhibit C – Project-Specific Information
[ ] Exhibit D – Past Project Experience
[ ] Exhibit E – Past Project Experience (Continued)

CONTRACTOR CERTIFICATION
The undersigned certifies under oath that the information provided in this Contractor's Qualification Statement is true and sufficiently complete so as not to be misleading.

Organization's Authorized Representative Signature

Date

Printed Name and Title

NOTARY
State of:
County of:
Signed and sworn to before me this day of

Notary Signature

My commission expires:

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.

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AIA® Document A305® – 2020 Exhibit A

General Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

§ A.1 ORGANIZATION
§ A.1.1 Name and Location
§ A.1.1.1 Identify the full legal name of your organization.

§ A.1.1.2 List all other names under which your organization currently does business and, for each name, identify jurisdictions in which it is registered to do business under that trade name.

§ A.1.1.3 List all prior names under which your organization has operated and, for each name, indicate the date range and jurisdiction in which it was used.

§ A.1.1.4 Identify the address of your organization's principal place of business and list all office locations out of which your organization conducts business. If your organization has multiple offices, you may attach an exhibit or refer to a website.

§ A.1.2 Legal Status
§ A.1.2.1 Identify the legal status under which your organization does business, such as sole proprietorship, partnership, corporation, limited liability corporation, joint venture, or other.

.1 If your organization is a corporation, identify the state in which it is incorporated, the date of incorporation, and its four highest-ranking corporate officers and their titles, as applicable.

.2 If your organization is a partnership, identify its partners and its date of organization.

.3 If your organization is individually owned, identify its owner and date of organization.

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.

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User Notes: (1848331108)

.4 If the form of your organization is other than those listed above, describe it and identify its individual leaders:

§ A.1.2.2 Does your organization own, in whole or in part, any other construction-related businesses? If so, identify and describe those businesses and specify percentage of ownership.

§ A.1.3 Other Information

§ A.1.3.1 How many years has your organization been in business?

§ A.1.3.2 How many full-time employees work for your organization?

§ A.1.3.3 List your North American Industry Classification System (NAICS) codes and titles. Specify which is your primary NAICS code.

§ A.1.3.4 Indicate whether your organization is certified as a governmentally recognized special business class, such as a minority business enterprise, woman business enterprise, service disabled veteran owned small business, woman owned small business, small business in a HUBZone, or a small disadvantaged business in the 8(a) Business Development Program. For each, identify the certifying authority and indicate jurisdictions to which such certification applies.

§ A.2 EXPERIENCE

§ A.2.1 Complete Exhibit D to describe up to four projects, either completed or in progress, that are representative of your organization's experience and capabilities.

§ A.2.2 State your organization's total dollar value of work currently under contract.

§ A.2.3 Of the amount stated in Section A.2.2, state the dollar value of work that remains to be completed:

§ A.2.4 State your organization's average annual dollar value of construction work performed during the last five years.

§ A.3 CAPABILITIES

§ A.3.1 List the categories of work that your organization typically self-performs.

§ A.3.2 Identify qualities, accreditations, services, skills, or personnel that you believe differentiate your organization from others.

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User Notes: (1848331108)

§ A.3.3 Does your organization provide design collaboration or pre-construction services? If so, describe those services.

§ A.3.4 Does your organization use building information modeling (BIM)? If so, describe how your organization uses BIM and identify BIM software that your organization regularly uses.

§ A.3.5 Does your organization use a project management information system? If so, identify that system.

§ A.4 REFERENCES

§ A.4.1 Identify three client references:
(Insert name, organization, and contact information)

§ A.4.2 Identify three architect references:
(Insert name, organization, and contact information)

§ A.4.3 Identify one bank reference:
(Insert name, organization, and contact information)

§ A.4.4 Identify three subcontractor or other trade references:
(Insert name, organization, and contact information)

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User Notes: (1848331108)

AIA® Document A305® – 2020 Exhibit B

Financial and Performance Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

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.

§ B.1 FINANCIAL

§ B.1.1 Federal tax identification number:

§ B.1.2 Attach financial statements for the last three years prepared in accordance with Generally Accepted Accounting Principles, including your organization's latest balance sheet and income statement. Also, indicate the name and contact information of the firm that prepared each financial statement.

§ B.1.3 Has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, been the subject of any bankruptcy proceeding within the last ten years?

§ B.1.4 Identify your organization's preferred credit rating agency and identification information.
(Identify rating agency, such as Dun and Bradstreet or Equifax, and insert your organization's identification number or other method of searching your organization's credit rating with such agency.)

§ B.2 DISPUTES AND DISCIPLINARY ACTIONS

§ B.2.1 Are there any pending or outstanding judgments, arbitration proceedings, bond claims, or lawsuits against your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A, Section 1.2, in which the amount in dispute is more than $75,000?
(If the answer is yes, provide an explanation.)

§ B.2.2 In the last five years has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 failed to complete work awarded to it?

.2 been terminated for any reason except for an owners' convenience?

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User Notes: (1934846794)

.3 had any judgments, settlements, or awards pertaining to a construction project in which your organization was responsible for more than $75,000?

.4 filed any lawsuits or requested arbitration regarding a construction project?

§ B.2.3 In the last five years, has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management; or any of the individuals listed in Exhibit A Section 1.2:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 been convicted of, or indicted for, a business-related crime?

.2 had any business or professional license subjected to disciplinary action?

.3 been penalized or fined by a state or federal environmental agency?

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AIA® Document A305® – 2020 Exhibit C

Project Specific Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

PROJECT:
(Name and location or address.)

CONTRACTOR'S PROJECT OFFICE:
(Identify the office out of which the contractor proposes to perform the work for the Project.)

TYPE OF WORK SOUGHT
(Indicate the type of work you are seeking for this Project, such as general contracting, construction manager as constructor, design-build, HVAC subcontracting, electrical subcontracting, plumbing subcontracting, etc.)

CONFLICT OF INTEREST
Describe any conflict of interest your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A Section 1.2, may have regarding this Project.

§ C.1 PERFORMANCE OF THE WORK
§ C.1.1 When was the Contractor's Project Office established?

§ C.1.2 How many full-time field and office staff are respectively employed at the Contractor's Project Office?

§ C.1.3 List the business license and contractor license or registration numbers for the Contractor's Project Office that pertain to the Project.

§ C.1.4 Identify key personnel from your organization who will be meaningfully involved with work on this Project and indicate (1) their position on the Project team, (2) their office location, (3) their expertise and experience, and (4) projects similar to the Project on which they have worked.

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.

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§ C.1.5 Identify portions of work that you intend to self-perform on this Project.

§ C.1.6 To the extent known, list the subcontractors you intend to use for major portions of work on the Project.

§ C.2 EXPERIENCE RELATED TO THE PROJECT

§ C.2.1 Complete Exhibit D to describe up to four projects performed by the Contractor's Project Office, either completed or in progress, that are relevant to this Project, such as projects in a similar geographic area or of similar project type. If you have already completed Exhibit D, but want to provide further examples of projects that are relevant to this Project, you may complete Exhibit E.

§ C.2.2 State the total dollar value of work currently under contract at the Contractor's Project Office:

§ C.2.3 Of the amount stated in Section C.2.2, state the dollar value of work that remains to be completed:

§ C.2.4 State the average annual dollar value of construction work performed by the Contractor's Project Office during the last five years.

§ C.2.5 List the total number of projects the Contractor's Project Office has completed in the last five years and state the dollar value of the largest contract the Contractor's Project Office has completed during that time.

§ C.3 SAFETY PROGRAM AND RECORD

§ C.3.1 Does the Contractor's Project Office have a written safety program?

§ C.3.2 List all safety-related citations and penalties the Contractor's Project Office has received in the last three years.

§ C.3.3 Attach the Contractor's Project Office's OSHA 300a Summary of Work-Related Injuries and Illnesses form for the last three years.

§ C.3.4 Attach a copy of your insurance agent's verification letter for your organization's current workers' compensation experience modification rate and rates for the last three years.

§ C.4 INSURANCE

§ C.4.1 Attach current certificates of insurance for your commercial general liability policy, umbrella insurance policy, and professional liability insurance policy, if any. Identify deductibles or self-insured retentions for your commercial general liability policy.

§ C.4.2 If requested, will your organization be able to provide property insurance for the Project written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis?

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§ C.4.3 Does your commercial general liability policy contain any exclusions or restrictions of coverage that are prohibited in AIA Document A101-2017, Exhibit A, Insurance A.3.2.2.2? If so, identify.

§ C.5 SURETY

§ C.5.1 If requested, will your organization be able to provide a performance and payment bond for this Project?

§ C.5.2 Surety company name:

§ C.5.3 Surety agent name and contact information:

§ C.5.4 Total bonding capacity:

§ C.5.5 Available bonding capacity as of the date of this qualification statement:

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AIA® Document A305® – 2020 Exhibit D

Contractor's Past Project Experience

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

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DOCUMENT 00 72 00

GENERAL CONDITIONS

1 PART 1 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

A. The provisions of the Standard AIA Document A232, 2019 Edition, General Conditions of the Contract for Construction, shall apply to all work of the project.

B. A copy of the General Conditions of the Contract for Construction is included for informational purposes only and may be purchased from the Architect at cost.

END OF DOCUMENT

AIA® Document A232® – 2019

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

for the following PROJECT:
(Name, and location or address)

2023 Capital Improvements Project – Phase 3
Odessa-Montour Central School District
300 College Avenue
Odessa, NY 14869

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

LeChase Construction Service, LLC
11849 East Corning Road
Corning, NY 14830

THE OWNER:
(Name, legal status, and address)

Odessa-Montour Central School District
300 College Avenue
Odessa, NY 14869

THE ARCHITECT:
(Name, legal status, and address)

Arcadis
59-61 Court Street, Suite 300
Binghamton, NY 13901

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

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

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

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents. The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract. The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and the Construction Manager or the Construction Manager's consultants, (3) between the Owner and the Architect or the Architect's consultants, (4) between the Contractor and the Construction Manager or the Construction Manager's consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their duties.

§ 1.1.3 The Work. The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by other Contractors, and by the Owner's own forces and Separate Contractors.

§ 1.1.5 Contractors. Contractors are persons or entities, other than the Contractor or Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager.

§ 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner not administered by the Architect and Construction Manager.

§ 1.1.7 The Drawings. The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.8 The Specifications. The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.9 Instruments of Service. Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.10 Initial Decision Maker. The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

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§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

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

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building

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Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work, and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements,

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assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. Unless otherwise provided under the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 The Owner shall retain a construction manager adviser lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.4 If the employment of the Construction Manager or Architect terminates, the Owner shall employ a successor construction manager or architect to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.

§ 2.3.5 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.6 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.7 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3.8 The Owner shall forward all communications to the Contractor through the Construction Manager. Other communication shall be made as set forth in Section 4.2.6.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to review by the Construction Manager and prior approval of the Architect, and the Construction Manager or Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Construction Manager's and Architect's and their respective consultants' additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction

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where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager or Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.5, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Construction Manager and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information submitted to the Construction Manager in such form as the Construction Manager and Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Construction Manager and Architect any nonconformity discovered by or made known to the Contractor as a request for information submitted to Construction Manager in such form as the Construction Manager and Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner, the Construction Manager, and the Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. The Construction Manager shall review the proposed alternative for sequencing, constructability, and coordination impacts on the other Contractors. Unless the Architect or the Construction Manager objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of the Project already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect, in consultation with the Construction Manager, and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner, Construction Manager, and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Construction Manager or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

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

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

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit. The Contractor shall secure and pay for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or

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(2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner, Construction Manager, and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect and Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect, in consultation with the Construction Manager, determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner, Construction Manager, and Contractor, stating the reasons. If the Owner or Contractor disputes the Architect's determination or recommendation, either party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner, Construction Manager, and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents:

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

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect, through the Construction Manager, of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor, stating whether the Owner, the Construction Manager, or the Architect (1) has reasonable objection to the proposed superintendent or (2) require additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner, Construction Manager, or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

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§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information, and the Construction Manager's use in developing the Project schedule, a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project. The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other Contractors, or the construction or operations of the Owner's own forces or Separate Contractors.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Construction Manager's and Architect's approval. The Architect and Construction Manager's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Construction Manager and Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall participate with other Contractors, the Construction Manager, and the Owner in reviewing and coordinating all schedules for incorporation into the Project schedule that is prepared by the Construction Manager. The Contractor shall make revisions to the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project schedule.

§ 3.10.4 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner, Construction Manager, and Architect, and incorporated into the approved Project schedule.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Construction Manager, Architect, and Owner, and delivered to the Construction Manager for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data, and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

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

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

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect and Construction Manager is subject to the limitations of Sections 4.2.10 through 4.2.12. Informational submittals upon which the Construction Manager and Architect are not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Construction Manager or Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Construction Manager, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract

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Documents, in accordance with the Project submittal schedule approved by the Construction Manager and Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner's own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor's Shop Drawings, Product Data, Samples, and similar submittals with related documents submitted by other Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Construction Manager, and Architect, that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been reviewed and approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Construction Manager and Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Construction Manager and Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner, the Architect, and the Construction Manager shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Construction Manager shall review submittals for sequencing, constructability, and coordination impacts on other Contractors.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Construction Manager and Architect at the time and in the form specified by the Architect.

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§ 3.13 Use of Site

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 The Contractor shall coordinate the Contractor's operations with, and secure the approval of, the Construction Manager before using any portion of the site.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Separate Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, other Contractors, or the Owner, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner, or Construction Manager with the Owner's approval, may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner, Construction Manager, and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Construction Manager, Architect, Construction Manager's and Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the 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 (other than the Work itself), but only to the extent caused by the 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 that would otherwise exist as to a party or person described in this Section 3.18.

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§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 The Construction Manager is the person or entity retained by the Owner pursuant to Section 2.3.3 and identified as such in the Agreement.

§ 4.1.3 Duties, responsibilities, and limitations of authority of the Construction Manager and Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Construction Manager, Architect, and Contractor. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Construction Manager and Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner's representatives during construction until the date the Architect issues the final Certificate for Payment. The Construction Manager and Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager known deviations from the Contract Documents and defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Contractors in accordance with the latest approved Project schedule.

§ 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of, or be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.

§ 4.2.6 Communications. The Owner shall communicate with the Contractor and the Construction Manager's consultants through the Construction Manager about matters arising out of or relating to the Contract Documents. The Owner and Construction Manager shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Construction Manager otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with other Contractors shall be

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through the Construction Manager. Communications by and with the Owner's own forces and Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents, and will notify each other about the rejection. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, upon written authorization of the Owner, whether or not the Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect's nor the Construction Manager's authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 Utilizing the submittal schedule provided by the Contractor, the Construction Manager shall prepare, and revise as necessary, a Project submittal schedule incorporating information from other Contractors, the Owner, Owner's consultants, Owner's Separate Contractors and vendors, governmental agencies, and participants in the Project under the management of the Construction Manager. The Project submittal schedule and any revisions shall be submitted to the Architect for approval.

§ 4.2.10 The Construction Manager will receive and promptly review for conformance with the submittal requirements of the Contract Documents, all submittals from the Contractor such as Shop Drawings, Product Data, and Samples. Where there are other Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from the Contractor and other Contractors, and transmit to the Architect those recommended for approval. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Construction Manager represents to the Owner and Architect that the Construction Manager has reviewed and recommended them for approval. The Construction Manager's actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.

§ 4.2.11 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Upon the Architect's completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.12 Review of the Contractor's submittals by the Construction Manager and Architect is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Construction Manager and Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Construction Manager and Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.13 The Construction Manager will prepare Change Orders and Construction Change Directives.

§ 4.2.14 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7, and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

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§ 4.2.15 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples, and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.16 The Construction Manager will assist the Architect in conducting inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application and Certificate for Payment or final Project Application and Project Certificate for Payment upon the Contractor's compliance with the requirements of the Contract Documents.

§ 4.2.17 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Construction Manager of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.18 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of the Construction Manager, Owner, or Contractor through the Construction Manager. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.19 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions so rendered in good faith.

§ 4.2.20 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.21 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager's recommendation. The Architect will review and respond in writing, through the Construction Manager, to requests for information about the Contract Documents. The Construction Manager's recommendation and the Architect's response to each request will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

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

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Construction Manager, for review by the Owner, Construction Manager and Architect, of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor whether the Owner, the Construction Manager or the Architect (1) has reasonable objection to any such proposed person or entity or, (2) requires additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Construction Manager or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner, Construction Manager or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, that the Contractor, by these Contract Documents, assumes toward the Owner, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor Contractor or other entity. If the Owner assigns the subcontract to a successor Contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor Contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

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§ 6.1.2 When the Owner performs construction or operations with the Owner's own forces or Separate Contractors, the Owner shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with them.

§ 6.1.3 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner's own forces, Separate Contractors, Construction Manager and other Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner's own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Construction Manager and the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's or other Contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractors or other Contractors that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a Separate Contractors or to other Contractors, because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of delays, improperly timed activities, damage to the Work or defective construction by the Owner's own forces, Separate Contractors, or other Contractors.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction, or to property of the Owner, Separate Contractors, or other Contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner, Separate Contractors, and other Contractors shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Construction Manager, Architect and Contractor. A Construction Change Directive requires agreement by the Owner, Construction Manager and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

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§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

A Change Order is a written instrument prepared by the Construction Manager and signed by the Owner, Construction Manager, Architect, and Contractor, stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Construction Manager and signed by the Owner, Construction Manager and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Construction Manager shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Construction Manager and Architect;
.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Construction Manager of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

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§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Construction Manager and Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Construction Manager and Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Construction Manager and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Construction Manager that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner, Architect, Construction Manager, or an employee of any of them, or of the Owner's own forces, Separate Contractors, or other Contractors; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section

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15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts and the Architect, based on the recommendation of the Construction Manager, determines justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

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

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Construction Manager, before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Construction Manager and the Architect. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The Construction Manager shall forward to the Architect the Contractor's schedule of values. Any changes to the schedule of values shall be submitted to the Construction Manager and supported by such data to substantiate its accuracy as the Construction Manager and the Architect may require, and unless objected to by the Construction Manager or the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least fifteen days before the date established for each progress payment, the Contractor shall submit to the Construction Manager an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner, Construction Manager or Architect require, such as copies of requisitions, and releases of waivers of lien from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Construction Manager and Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all

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Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 Where there is only one Contractor, the Construction Manager will, within seven days after the Construction Manager's receipt of the Contractor's Application for Payment, review the Application, certify the amount the Construction Manager determines is due the Contractor, and forward the Contractor's Application and Certificate for Payment to the Architect. Within seven days after the Architect receives the Contractor's Application for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Certificate for Payment, in the full amount of the Application for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward to the Contractor the Architect's notice of withholding certification.

§ 9.4.2 Where there is more than one Contractor performing portions of the Project, the Construction Manager will, within seven days after the Construction Manager receives all of the Contractors' Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due each of the Contractors; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Contractor's application with information from similar applications for progress payments from the other Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Contractors; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and Certificate for Payment to the Architect.

§ 9.4.2.1 Within seven days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Project Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors.

§ 9.4.3 The Construction Manager's certification of an Application for Payment or, in the case of more than one Contractor, a Project Application and Certificate for Payment, shall be based upon the Construction Manager's evaluation of the Work and the data in the Application or Applications for Payment. The Construction Manager's certification will constitute a representation that, to the best of the Construction Manager's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.4 The Architect's issuance of a Certificate for Payment or, in the case of more than one Contractor, Project Application and Certificate for Payment, shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and data in the Application for Payment or Project Application for Payment. The Architect's certification will constitute a representation that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Construction Manager or Architect.

§ 9.4.6 The issuance of a Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality

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or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Construction Manager or Architect may withhold a Certificate for Payment or Project Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's opinion the representations to the Owner required by Section 9.4.3 and 9.4.4 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1 and 9.4.2. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment or a Project Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment or Project Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from the acts and omissions described in Section 3.3.2 because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor or other Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect or Construction Manager withholds certification for payment under Section 9.5.1, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Construction Manager, and both will reflect such payment on the next Certificate for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment or Project Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Construction Manager and Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Construction Manager will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Owner, Construction Manager and Architect on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor

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fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner, Construction Manager nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Construction Manager and Architect do not issue a Certificate for Payment or a Project Certificate for Payment, through no fault of the Contractor, within fourteen days after the Construction Manager's receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Construction Manager and Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Construction Manager, and the Contractor and Construction Manager shall jointly prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the list, the Architect, assisted by the Construction Manager, will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect, assisted by the Construction Manager, to determine Substantial Completion.

§ 9.8.4 When the Architect, assisted by the Construction Manager, determines that the Work of all of the Contractors, or designated portion thereof, is substantially complete, the Construction Manager will prepare, and the Construction

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Manager and Architect shall execute, a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor and Construction Manager shall jointly prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect after consultation with the Construction Manager.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Construction Manager, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Construction Manager a notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Contractor's Application for Payment. Upon receipt, the Construction Manager shall perform an inspection to confirm the completion of Work of the Contractor. The Construction Manager shall make recommendations to the Architect when the Work of all of the Contractors is ready for final inspection, and shall then forward the Contractors' notices and Application for Payment or Project Application for Payment, to the Architect, who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Construction Manager's and Architect's final Certificate for Payment or Project Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect through the Construction Manager (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6), if required by the Owner, other data

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establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Construction Manager and Architect so confirm, the Owner shall, upon application by the Contractor and certification by the Construction Manager and Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect through the Construction Manager prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall submit the Contractor's safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager's responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor;
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction; and
- **.4** construction or operations by the Owner, Separate Contractors, or other Contractors.

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

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

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§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner, Construction Manager and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner, Construction Manager and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor, Construction Manager and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor, the Construction Manager and the Architect will promptly reply to the Owner in writing stating whether or not any of them has reasonable objection to the persons or entities proposed by the Owner. If the Contractor, Construction Manager or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor, the Construction Manager and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Construction Manager, Architect, their consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of

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tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Construction Manager and Construction Manager's consultants, and the Architect and Architect's consultants, shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice directly to the Owner, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the

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Contract Documents, the Owner shall inform both the Contractor and the Construction Manager, separately and in writing, prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice directly to the Contractor, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Construction Manager and Construction Manager's consultants; (3) the Architect and Architect's consultants; (4) other Contractors and any of their subcontractors, sub-subcontractors, agents, and employees; and (5) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Construction Manager, Construction Manager's consultants, Architect, Architect's consultants, other Contractors, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor, Architect, and Construction Manager for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to

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requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Construction Manager, Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Construction Manager, Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

§ 12.1.2 If a portion of the Work has been covered that the Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner, Construction Manager or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

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§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner, Separate Contractors, or other Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

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

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

§ 13.3.2 No action or failure to act by the Owner, Construction Manager, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become

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requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Construction Manager, Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Construction Manager and Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Construction Manager's and Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Construction Manager for transmittal to the Architect.

§ 13.4.5 If the Construction Manager or Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Construction Manager or Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Construction Manager has not certified or the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

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§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees, or any other persons performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, after consultation with the Construction Manager, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall, upon application, be certified by the Initial Decision Maker after consultation with the Construction Manager, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and the Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent:

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of this Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

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.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Construction Manager and Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost. If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

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

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§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages. The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties, the Construction Manager, and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation

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within 30 days of receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

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§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

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DOCUMENT 00 82 00

PREVAILING WAGE RATES

1 PART 1 PREVAILING WAGE RATES

A. Prospective bidder shall note that the applicable prevailing wage rates, as determined by the New York State Bureau of Public Works Labor Department, are applicable for all phases of the work on this project.

B. The Prevailing Wage Rates attached are hereby made a part of this contract, in accordance with Section 220 of the Labor Law. All prospective bidders shall adhere to this documentation when preparing their bids.

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Contractor Registry

Effective December 30, 2024 all contractors and subcontractors submitting bids or performing construction work on public work projects, or private projects covered by Article 8 of the Labor Law, are required to register with the New York State Department of Labor (NYSDOL) under Labor Law Section 220-i. To register, contractors and subcontractors must submit an application through NYSDOL's Contractor Registry portal which is available through the agency's Management System for Protecting Worker Rights (MPWR) https://mpwr-public.labor.ny.gov/en/login.

For additional information, please visit online.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission: a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract MUST obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule MUST be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion online.

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project.

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule form the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12226; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.ny.gov.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is REQUIRED to provide complete copies to all prime contractors who in turn MUST, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.ny.gov.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website

www.labor.ny.gov.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. As per Article 6 of the Labor law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemperaneous, true, and accurate payroll records. At a minimum, payrolls must show the following information for each person employed on a public work project: Name, Address, Last 4 Digits of Social Security Number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid or provided, and Daily and weekly number of hours worked in each classification.

The filing of payrolls to the Department of Jurisdiction is a condition of payment.Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The Department of Jurisdiction (Contracting Agency) shall collect, review for facial validity, and maintain such payrolls.

In addition, the Commissioner of Labor may require contractors to furnish, with ten (10) days of a request, payroll records sworn to as their validity and accuracy for public work and private work. Payroll records include, but are not limited to time cards, work description sheets, proof that supplements were provided, cancelled payroll checks and payrolls. Failure to provide the requested information within the allotted ten (10) days will result in the withholding of up to 25% of the contract, not to exceed $100,000.00. If the contractor or subcontractor does not maintain a place of business in New York State and the amount of the contract exceeds $25,000.00, payroll records and certifications must be kept on the project worksite.

The prime contractor is responsible for any underpayments of prevailing wages or supplements by any subcontractor.

All contractors or their subcontractors shall provide to their subcontractors a copy of the Prevailing Rate Schedule specified in the public work contract as well as any subsequently issued schedules. A failure to provide these schedules by a contractor or subcontractor is a violation of Article 8, Section 220-a of the Labor Law.

All subcontractors engaged by a public work project contractor or its subcontractor, upon receipt of the original schedule and any subsequently issued schedules, shall provide to such contractor a verified statement attesting that the subcontractor has received the Prevailing Rate Schedule and will pay or provide the applicable rates of wages and supplements specified therein. (See NYS Labor Laws, Article 8 . Section 220-a).

Determination of Prevailing Wage and Supplement Rate Updates Applicable to All Counties

The wages and supplements contained in the annual determination become effective July 1st whether or not the new determination has been received by a given contractor. Care should be taken to review the rates for obvious errors. Any corrections should be brought to the Department's attention immediately. It is the responsibility of the public work contractor to use the proper rates. If there is a question on the proper classification to be used, please call the district office located nearest the project. Any errors in the annual determination will be corrected and posted to the NYSDOL website on the first business day of each month. Contractors are responsible for paying these updated rates as well, retroactive to July 1st.

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. To the extent possible, the Department posts rates in its possession that cover periods of time beyond the July 1st to June 30th time frame covered by a particular annual determination. Rates that extend beyond that instant time period are informational ONLY and may be updated in future annual determinations that actually cover the then appropriate July 1st to June 30th time period.

Withholding of Payments

When a complaint is filed with the Commissioner of Labor alleging the failure of a contractor or subcontractor to pay or provide the prevailing wages or supplements, or when the Commissioner of Labor believes that unpaid wages or supplements may be due, payments on the public work contract shall be withheld from the prime contractor in a sufficient amount to satisfy the alleged unpaid wages and supplements, including interest and civil penalty, pending a final determination.

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor Law to so notify the financial officer of the Department of Jurisdiction (Contracting Agency) that awarded the public work contract. Such officer MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor. The withholding continues until there is a final determination of the underpayment by the Commissioner of Labor or by the court in the event a legal proceeding is instituted for review of the determination of the Commissioner of Labor.

The Department of Jurisdiction (Contracting Agency) shall comply with this order of the Commissioner of Labor or of the court with respect to the release of the funds so withheld.

Summary of Notice Posting Requirements

The current Prevailing Rate Schedule must be posted in a prominent and accessible place on the site of the public work project. The prevailing wage schedule must be encased in, or constructed of, materials capable of withstanding adverse weather conditions and be titled "PREVAILING RATE OF WAGES" in letters no smaller than two (2) inches by two (2) inches.

The "Public Work Project" notice must be posted at the beginning of the performance of every public work contract, on each job site.

Every employer providing workers. compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers. Compensation Board in a conspicuous place on the jobsite.

Every employer subject to the NYS Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers, notices furnished by the State Division of Human Rights.

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the NYS Department of Labor.

Apprentices

Employees cannot be paid apprentice rates unless they are individually registered in a program registered with the NYS Commissioner of Labor. The allowable ratio of apprentices to journeyworkers in any craft classification can be no greater than the statewide building trade ratios promulgated by the Department of Labor and included with the Prevailing Rate Schedule. An employee listed on a payroll as an apprentice who is not registered as above or is performing work outside the classification of work for which the apprentice is indentured, must be paid the prevailing journeyworker's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12226 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of $50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.

Social Security Numbers on Certified Payrolls:

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concern regarding inclusion of this information on payrolls if another identifier will suffice.

For these reasons, the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor. This change does not affect the Department's ability to request and receive the entire social security number from employers during its public work/ prevailing wage investigations.

Construction Industry Fair Play Act: Required Posting for Labor Law Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site. Failure to post the notice can result in penalties of up to $1,500 for a first offense and up to $5,000 for a second offense. The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, https://dol.ny.gov/public-work-and-prevailing-wage
If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.ny.gov .

Worker Notification: (Labor Law §220, paragraph a of subdivision 3-a)

Effective June 23, 2020

This provision is an addition to the existing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage and supplement rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address 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 job classification. The required notification will be provided with each wage schedule, may be downloaded from our website *www.labor.ny.gov* or be made available upon request by contacting the Bureau of Public Work at 518-457-5589. *In the event the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

(12.20)

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

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1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12226

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.

NEW YORK STATE OF OPPORTUNITY. Department of Labor

Required Notice under Article 25-B of the Labor Law

Attention All Employees, Contractors and Subcontractors: You are Covered by the Construction Industry Fair Play Act

The law says that you are an employee unless:

- You are free from direction and control in performing your job, **and**
- You perform work that is not part of the usual work done by the business that hired you, **and**
- You have an independently established business.

Your employer cannot consider you to be an independent contractor unless all three of these facts apply to your work.

It is against the law for an employer to misclassify employees as independent contractors or pay employees off the books.

Employee Rights: If you are an employee, you are entitled to state and federal worker protections. These include:

- Unemployment Insurance benefits, if you are unemployed through no fault of your own, able to work, and otherwise qualified,
- Workers' compensation benefits for on-the-job injuries,
- Payment for wages earned, minimum wage, and overtime (under certain conditions),
- Prevailing wages on public work projects,
- The provisions of the National Labor Relations Act, and
- A safe work environment.

It is a violation of this law for employers to retaliate against anyone who asserts their rights under the law. Retaliation subjects an employer to civil penalties, a private lawsuit or both.

Independent Contractors: If you are an independent contractor**, you must pay all taxes and Unemployment Insurance contributions required by New York State and Federal Law.**

Penalties for paying workers off the books or improperly treating employees as independent contractors:

• **Civil Penalty**	First offense: Up to $2,500 per employee Subsequent offense(s): Up to $5,000 per employee
• **Criminal Penalty**	First offense: Misdemeanor - up to 30 days in jail, up to a $25,000 fine and debarment from performing public work for up to one year. Subsequent offense(s): Misdemeanor - up to 60 days in jail or up to a $50,000 fine and debarment from performing public work for up to 5 years.

If you have questions about your employment status or believe that your employer may have violated your rights and you want to file a complaint, call the Department of Labor at (866) 435-1499 or send an email to dol.misclassified@labor.ny.gov. All complaints of fraud and violations are taken seriously. You can remain anonymous.

Employer Name:

IA 999 (09/16)

WE ARE YOUR DOL

NEW YORK STATE Department of Labor

New York State Department of Labor
Bureau of Public Work

Attention Employees

THIS IS A:

PUBLIC WORK PROJECT

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Your pay stub and wage notice received upon hire must clearly state your wage rate and supplement rate.

Chapter 629 of the Labor Laws of 2007:

These wages are set by law and must be posted at the work site. They can also be found at: https://dol.ny.gov/bureau-public-work

If you feel that you have not received proper wages or benefits, please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5287		

* For New York City government agency construction projects, please contact the Office of the NYC Comptroller at (212) 669-4443, or www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

Requirements for OSHA 10 Compliance

Article 8 §220-h requires that when the advertised specifications, for every contract for public work, is $250,000.00 or more the contract must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training "prior to the performing any work on the project."

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.)*
- Training roster, attendance record of other documentation from the certified trainer pending the issuance of the card.
- Other valid proof

**A certification by the employer attesting that all employees have completed such a course is not sufficient proof that the course has been completed.

Any questions regarding this statute may be directed to the New York State Department of Labor, Bureau of Public Work at 518-457-5589.

WICKS

Public work projects are subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work, when the total project's threshold is $3 million in Bronx, Kings, New York, Queens and, Richmond counties; $1.5 million in Nassau, Suffolk and Westchester counties; and $500,000 in all other counties.

For projects below the monetary threshold, bidders must submit a sealed list naming each subcontractor for the plumbing, HVAC and electrical and the amount to be paid to each. The list may not be changed unless the public owner finds a legitimate construction need, including a change in specifications or costs or the use of a Project Labor Agreement (PLA), and must be open to public inspection.

Allows the state and local agencies and authorities to waive the Wicks Law and use a PLA if it will provide the best work at the lowest possible price. If a PLA is used, all contractors shall participate in apprentice training programs in the trades of work it employs that have been approved by the Department of Labor (DOL) for not less than three years. They shall also have at least one graduate in the last three years and use affirmative efforts to retain minority apprentices. PLA's would be exempt from Wicks, but deemed to be public work subject to prevailing wage enforcement.

The Commissioner of Labor shall have the power to enforce separate specification requirement s on projects, and may issue stop-bid orders against public owners for non-compliance.

Other new monetary thresholds, and similar sealed bidding for non-Wicks projects, would apply to certain public authorities including municipal housing authorities, NYC Construction Fund, Yonkers Educational Construction Fund, NYC Municipal Water Finance Authority, Buffalo Municipal Water Finance Authority, Westchester County Health Care Association, Nassau County Health Care Corp., Clifton-Fine Health Care Corp., Erie County Medical Center Corp., NYC Solid Waste Management Facilities, and the Dormitory Authority.

Contractors must pay subcontractors within a 7 days period.

(07.19)

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway,
building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the
responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district
office located nearest to the project. District office locations and phone numbers are listed below.
Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county
basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.
Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing,
or rental type units intended for residential use.
Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or
locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of
Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

*Contractor Registry (LL 220-I): Effective December 30th, 2024
Labor Law Section 220-i(6) prohibits contractors from bidding on public work and prohibits both contractors and subcontractors from commencing work
on private and public projects subject to prevailing wage requirements. This section requires contractors to submit their Certificate of Registration with
their bid materials. Each Certificate of Registration will have a unique registration number. Failure to provide proof of registration, as required by Labor
Law Section 220-i, as a minimum qualification will result in the bidder being deemed non-responsive. There is a public database of registered contractors and subcontractors available online at data.ny.gov to confirm registration validity. For additional information on how to register and the
requirements, visit https://dol.ny.gov/public-work-contractor-and-subcontractor-registry-landing

*Electronic Certified Payroll (LL 220-K): Effective December 31st, 2025
Effective December 31, 2025, all contractors and subcontractors who perform public work, or covered private work subject to the prevailing wage, will be
required to submit certified payrolls electronically to the Bureau of Public Work and Prevailing Wage Enforcement. Additional information about the
electronic certified payroll submission system will be made available on the Department's Website at https://dol.ny.gov/Electronic-Payroll

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less that six (6) years, contemporaneous, true, and accurate payroll records.

Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury.

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. However, the specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will

indicate these conditions as required.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.ny.gov) for current wage rate information.

Shift Work

If the timeline of the contract requires shift work be performed to meet deadlines, the BPWE will enforce the shift work rate as the required rate on
the project whether or not shift work is specifically addressed in the contract.

Paid Prenatal Leave

Every employer shall be required to provide to its employees twenty hours of paid prenatal personal leave during any fifty-two week calendar period. Paid prenatal personal leave shall mean leave taken for the health care services received by an employee during their pregnancy or related to such pregnancy, including physical examinations, medical procedures, monitoring and testing, and discussions with a health care
provider related to the pregnancy. Paid prenatal personal leave may be taken in hourly increments. Benefits for paid prenatal personal leave shall
be paid in hourly installments. Employees shall receive compensation at the employee's regular rate of pay, or the applicable minimum wage established by the labor law, whichever is greater, for the use of Paid Prenatal leave.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4
Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3
Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12226

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Schuyler County General Construction

Boilermaker — 07/01/2025

JOB DESCRIPTION Boilermaker **DISTRICT** 12

ENTIRE COUNTIES
Allegany, Cattaraugus, Chautauqua, Chemung, Erie, Genesee, Livingston, Monroe, Niagara, Ontario, Orleans, Schuyler, Steuben, Wayne, Wyoming, Yates

WAGES

Per hour:	07/01/2025	01/01/2026 Additional
Boilermaker	$ 39.35	$ 2.50*

The wage rate will be 90% of the above for Maintenance work on boilers less than 100,000 pph.

*To be allocated at a later date.

SUPPLEMENTAL BENEFITS
Per hour: $ 33.52*

*NOTE: $32.03 of this amount is for every Hour "Paid"

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
1st Term at 12 Months
Terms 3-8 at 6 Months
Per Hour:
1st 65%
3rd 70% 4th 75% 5th 80% 6th 85% 7th 90% 8th 95%

Supplemental Benefits per hour:

All Terms $ 33.52**

**NOTE: $32.03 of this amount is for every Hour "Paid"

12-7

Broadband — 07/01/2025

JOB DESCRIPTION Broadband **DISTRICT** 4

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Orange: Entire County except Village of Greenwood Lake, Village of Highland Falls, Town of Tuxedo, and Town of Patterson

WAGES

Per Hour:	07/01/2025	08/04/2025 Additional
Field Tech Install/Repair	$ 51.27	3% Per Hour

For outside work (excluding installation on building construction/alteration/renovation projects), stopping at first point of attachment (demarcation), installing/maintaining/repairing broadband internet service.

Applies to projects receiving ConnectAll funding that are subject to New York State Labor Law §224-E.

SUPPLEMENTAL BENEFITS
Per Hour:
$ 23.24

OVERTIME PAY
See (B, K, *R) on OVERTIME PAGE
* Two and one half times the hourly rate after the 8th hour

HOLIDAY
Paid: See (5, 6, 7, 11, 12) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 12) on HOLIDAY PAGE

4-CWA-Dist2

Carpenter - Building 07/01/2025

JOB DESCRIPTION Carpenter - Building **DISTRICT** 2

ENTIRE COUNTIES
Chemung, Cortland, Schuyler, Steuben, Tompkins

PARTIAL COUNTIES
Allegany: Only the Township of Alfred.

WAGES

Per hour:	07/01/2025	01/01/2026	07/01/2026 Additional	07/01/2027 Additional
Carpenter	$ 31.59	$ 32.09	$ 3.50*	$ 4.00*
Floor Coverer	31.59	32.09	3.50*	4.00*
Carpet Layer	31.59	32.09	3.50*	4.00*
Dry-Wall	31.59	32.09	3.50*	4.00*
Diver-Wet Day	61.25	61.25	0.00	4.00*
Diver -Dry Day	32.59	33.09	3.50*	4.00*
Diver Tender	32.59	33.09	3.50*	4.00*

*To be allocated at a later date

NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):
- Pile Drivers/Dock Builders shall receive $0.25 per hour over the journeyworker's rate of pay when performing piledriving/dock building work.
- Certified welders shall receive $1.00 per hour over the journeyworker's rate of pay when the employee is required to be certified and performs DOT or ABS specified welding work (Effective 7/1/2026 premium increases to $3.00/hr and will include premium when AWS certification is required).
- When an employee performs work within a contaminated area on a State and/or Federally designated hazardous waste site, and where relevant State and/or Federal regulations require employees to be furnished and use or wear required forms of personal protection, then the employee shall receive his regular hourly rate plus $1.50 per hour.
- Depth pay for Divers based upon deepest depth on the day of the dive (per diem payment):
  0' to 80' no additional fee
  81'to 100' additional $.50 per foot
  101'to 150' additional $0.75 per foot
  151'and deeper additional $1.25 per foot
- Penetration pay for Divers based upon deepest penetration on the day of the dive (per diem payment):
  0' to 50' no additional fee
  51' to 100' additional $.75 per foot
  101' and deeper additional $1.00 per foot
- Diver rates applies to all hours worked on dive day.

SHIFT WORK
On Agency/Owner mandated shift work, the following rates will be applicable:
1st Shift - Regular Rate
2nd Shift - Premium of 7% of base wage per hour (Effective 7/1/2026 premium increases to 10%)
3rd Shift - Premium of 14% of base wage per hour (Effective 7/1/2026 premium increases to 15%)
Shift work shall be defined as implementing at least two (2) shifts in a twenty-four (24) consecutive hour period. Shift work must be for a minimum of three (3) consecutive days.

SUPPLEMENTAL BENEFITS
Per hour:

	07/01/2025	01/01/2026
Journeyworker	$ 23.39	$ 23.39

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: Any holiday which occurs on Sunday shall be observed the following Monday. If Christmas falls on a Saturday, it shall be observed on the prior Friday.

REGISTERED APPRENTICES
Wages per hour (1300 hour terms at the following percentage of Journeyworker's base wage):

1st	2nd	3rd	4th
65%	70%	75%	80%

Supplemental Benefits per hour:

$ 12.55	$ 12.55	$ 15.15	$ 15.15

NOTE ADDITIONAL AMOUNTS PAID TO APPRENTICES FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):
- Pile Driving/Dock Builder apprentices shall receive an additional $0.25 per hour worked when performing piledriving/dock building work.
- Certified Welders shall receive $1.00 per hour over the apprentices rate of pay when the apprentice is required to be certified and performs DOT or ABS specified welding work (Effective 7/1/2026 premium increases to $3.00/hr and will include premium when AWS certification is required).
- When an apprentice performs work within a contaminated area on a State and/or Federally designated hazardous waste site, and where relevant State and/or Federal regulations require the apprentice to be furnished and use or wear required forms of personal protection, then the apprentice shall receive his regular hourly rate plus $1.50 per hour.

2-277B-CS

Carpenter - Building / Heavy&Highway — 07/01/2025

JOB DESCRIPTION Carpenter - Building / Heavy&Highway **DISTRICT** 2

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Orange: The area lying on Northern side of Orange County demarcated by a line drawn from the Bear Mountain Bridge continuing west to the Bear Mountain Circle, continue North on 9W to the town of Cornwall where County Road 107 (also known as Quaker Rd) crosses under 9W, then east on County Road 107 to Route 32, then north on Route 32 to Orrs Mills Rd, then west on Orrs Mills Rd to Route 94, continue west and south on Route 94 to the Town of Chester, to the intersection of Kings Highway, continue south on Kings Highway to Bellvale Rd, west on Bellvale Rd to Bellvale Lakes Rd, then south on Bellvale Lakes Rd to Kain Rd, southeast on Kain Rd to Route 17A, then north and southeast along Route 17A to Route 210, then follow Route 210 to NJ Border.

WAGES

Wages per hour:	07/01/2025	07/01/2026 Additional	07/01/2027 Additional
Carpenter - ONLY for Artificial Turf/Synthetic Sport Surface	$ 37.94	$ 2.25*	$ 2.25*

* To be allocated at a later date.

Note - Does not include the operation of equipment. Please see Operating Engineers rates.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 27.34

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY
Paid: See (5) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE
Notes:
When a holiday falls upon a Saturday, it shall be observed on the preceding Friday. Whan a holiday falls upon a Sunday, it shall be observed on the following Monday.
An employee taking an unexcused day off the regularly scheduled day before or after a paid Holiday shall not receive Holiday pay.

REGISTERED APPRENTICES
Wages per hour (1300 hour terms at the following percentage of Journeyworker's wage):

1st	2nd	3rd	4th
65%	70%	75%	80%

Supplemental Benefits per hour:

$19.10	$19.69	$21.83	$22.42

2-42AtSS

Carpenter - Heavy&Highway — 07/01/2025

JOB DESCRIPTION Carpenter - Heavy&Highway **DISTRICT** 2

ENTIRE COUNTIES
Broome, Cayuga, Chemung, Cortland, Delaware, Jefferson, Lewis, Onondaga, Oswego, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Yates

WAGES

Per hour	07/01/2025	07/01/2026 Additional	07/01/2027 Additional
Carpenter	$ 39.52	$ 2.00*	$ 4.42*
Piledriver	39.52	2.00*	4.42*
Dockbuilder	39.52	2.00*	4.42*
Diver-Wet Day	64.52	2.00*	4.42*
Diver-Dry Day	40.52	2.00*	4.42*
Diver-Tender	40.52	2.00*	4.42*

*To be allocated at a later date.

NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):
- State or Federal designated hazardous site, requiring protective gear shall be an additional $2.50 per hour.
- Certified welders when required to perform welding work will receive an additional $5.00 per hour.

ADDITIONAL NOTES PERTAINING TO DIVERS/TENDERS:
- Divers and Tenders shall receive one and one half (1 1/2) times their regular diver and tender rate of pay for Effluent and Slurry diving.
- Divers and tenders being paid at the specified rate for Effluent and Slurry diving shall have all overtime rates based on the specified rate plus the appropriate overtime rates (one and one half or two times the specified rate for Slurry and Effluent divers and tenders).
- The pilot of an ADS or submersible will receive one and one-half (1 1/2) times the Diver-Wet Day Rate for time submerged.
- All crew members aboard a submersible shall receive the Diver-Wet Day rate.
- Depth pay for Divers based upon deepest depth on the day of the dive (per diem payment):
  0' to 50' no additional fee
  51' to 100' additional $0.50 per foot
  101' to 150' additional $0.75 per foot
  151' to 200' additional $1.25 per foot
  201' and deeper additional $1.50 per foot
- Penetration pay for Divers based upon deepest penetration on the day of the dive (per diem payment):
  0' to 50' no additional fee
  51' to 100' additional $0.75 per foot
  101' to 200' additional $1.00 per foot
  Over 201' additional $1.25 per foot
- Diver rates applies to all hours worked on dive day.

SHIFT WORK

When project owner mandates a single irregular work shift, the Journeyworkers and Apprentices will receive an additional $4.00 per hour. A single irregular work shift can start any time from 5:00 p.m. to 1:00 a.m.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker	$ 27.31

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

- In the event a Holiday falls on a Saturday, the Friday before will be observed as a Holiday. If a Holiday falls on a Sunday, then Monday will be observed as a Holiday.
- The employee must work their scheduled workday before and their scheduled workday after the holiday to receive holiday pay.

REGISTERED APPRENTICES

CARPENTER/PILEDRIVER/DOCKBUILDER APPRENTICES

Wages per hour (1300 hour terms at the following percentage of journeyworker's base wage):

1st	2nd	3rd	4th
65%	70%	75%	80%

Supplemental Benefits per hour:

$ 19.07	$ 19.66	$ 21.75	$ 22.34

NOTE ADDITIONAL AMOUNTS PAID PER HOUR WORKED TO APPRENTICES FOR SPECIFIC TYPES OF WORK PERFORMED:
- State or Federal designated hazardous site, requiring protective gear shall be an additional $2.50 per hour.
- Certified welders when required to perform welding work will receive an additional $5.00 per hour.

2-277HH-Bro

Electrician — 07/01/2025

JOB DESCRIPTION Electrician **DISTRICT** 6

ENTIRE COUNTIES

PARTIAL COUNTIES
Cayuga: Only the Township of Genoa.
Schuyler: Only the Townships of Cayuta, Catharine, and Hector.
Seneca: Only the Townships of Lodi and Covert.
Tioga: Only the Townships of Spencer and Candor.
Tompkins: Entire county except the Township of Groton.

WAGES

Per hour:	07/01/2025	06/01/2026 Additional	06/01/2027 Additional
Electrician	$ 44.50	$ 4.00*	$ 4.50*

* To be allocated at a later date.

NOTE: Additional amounts, subject to overtime premiums, due for the following work (applicable to all employees):
-Additional $1.00 per hour for work from trusses, scaffolds, frames, spider baskets, ladders, etc. 40 feet or more from ground floor or in underground mines or tunnels. Work done from personal lift equipment that complies with OSHA requirements are excluded.
-Additional $2.00 per hour when required to work under compressed air, on radio towers, on asbestos abatement projects which require the use of a respirator, work of a hazardous nature, work where gas masks are required or work requiring use of protective arc flash suits.

SHIFT WORK
THE FOLLOWING RATES WILL APPLY WHEN SHIFT WORK IS MANDATED EITHER IN THE JOB SPECIFICATION OR BY THE CONTRACTING AGENCY:

1ST SHIFT	8:00 AM to 4:30 PM	Regular wage rate
2ND SHIFT	4:30 PM to 1:00 AM	Regular wage rate plus 17.3%
3RD SHIFT	12:30 AM to 9:00 AM	Regular wage rate plus 31.4%

SUPPLEMENTAL BENEFITS

Per hour:	
Journeyworker	$ 30.55 plus 3% of hourly wage paid*

* NOTE: The 3% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY
See (B, *E, Q) on OVERTIME PAGE
* NOTE: On Saturday the first 8 hours worked shall be paid at a rate of one and one-half times the applicable rate. All additional hours are payable at double the straight time rate.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: When a holiday falls on a Saturday, the day preceding shall be celebrated as such, and when falling on a Sunday, Monday will be celebrated as the holiday.

REGISTERED APPRENTICES
WAGES per hour: One year terms at the following percentage of Journeyworker's wage.

1st year	50%
2nd year	55%
3rd year	65%
4th year	75%
5th year	85%

SUPPLEMENTAL BENEFITS per hour:

1st year	$ 14.25*
2nd year	14.25*
3rd year	24.30*
4th year	24.84*
5th year	26.38*

* PLUS 3% OF HOURLY WAGE PAID, STRAIGHT TIME RATE OR PREMIUM RATE.

6-241

Electrician **07/01/2025**

JOB DESCRIPTION Electrician **DISTRICT** 2

ENTIRE COUNTIES

Chemung, Steuben

PARTIAL COUNTIES
Allegany: Only the townships of Allen, Almond, Alfred, Andover, Birdsall, Burns, Granger, Grove, Hume, Independence, Ward, Wellsville, West Almond, Willing, and that portion of Amity, Angelica, Belfast, Caneadea, and Scio that lie east of the Genesee River.
Schuyler: Only the Townships of Dix, Montour, Orange, Reading and Tyrone.
Tioga: Only the Townships of Barton and Nichols.

WAGES

Per hour:	07/01/2025
Electrician (Base wage)	$ 43.40
Audio,Sound,Teledata	43.40

ADDITIONAL AMOUNTS FOR SPECIFIC TYPES OF JOBSITE CONDITIONS (amount subject to any overtime premiums):
Additional $1.00 per hour for high work defined as work being done more than 35' above the floor where electricians are working on Tooth Picks, Structural Steel, Temporary Platforms, Swinging Scaffolds and Boatswain Chairs.
Additional $1.00 per hour for work in shafts 25' deep and in tunnels 50' long under construction.
Additional $2.00 per hour for work inside or on Towers, Smoke Stacks and Wind Turbine Generators over 100' high.
Additional $2.00 per hour for work in hazardous locations requiring supplied air (other than Class A) and any other type of respiratory equipment required for Class B or Class C as defined in OSHA Standards.
Additional $3.00 per hour for work in hazardous locations requiring Class A supplied air as defined in OSHA Standards.

SHIFT WORK
When shift work is mandated in the job specifications or by the contracting agency, the following journeyworker hourly rates apply. The starting hours of a shift may be adjusted up to two (2) hours in order to meet the needs of the contracting agency.

Between the hours of 8:00AM and 4:30PM	$ 43.40
Between the hours of 4:30PM and 1:00AM	48.83
Between the hours of 12:30AM and 9:00AM	54.25

SUPPLEMENTAL BENEFITS
Per hour:
Journeyworker
$ 22.57 plus $ 7.85* plus 3% of hourly wage
*Subject to SAME PREMIUM as overtime work

OVERTIME PAY
See (B, *E, Q) on OVERTIME PAGE
*Work performed on Saturday shall be paid at one and one-half of the hourly rate for the first ten hours, then two times the hourly rate therafter.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 23) on HOLIDAY PAGE
When the holiday falls on Saturday, it shall be recognized and celebrated as such on the Friday before and when the holiday falls on Sunday, it shall be recognized and celebrated as such on the following Monday (December 24th excluded).

REGISTERED APPRENTICES
WAGES: One year terms at the following percent of Journeyworker's wage.

1st	2nd	3rd	4th	5th
50%	55%	65%	75%	85%

ADDITIONAL AMOUNTS FOR SPECIFIC TYPES OF JOBSITE CONDITIONS (amount subject to any overtime premiums):
Additional $1.00 per hour for high work defined as work being done more than 35' above the floor where electricians are working on Tooth Picks, Structural Steel, Temporary Platforms, Swinging Scaffolds and Boatswain Chairs.
Additional $2.00 per hour for work inside or on Towers, Smoke Stacks and Wind Turbine Generators over 100' high.
Additional $1.00 per hour for work in shafts 25' deep and in tunnels 50' long under construction.
Additional $3.00 per hour for work in hazardous locations requiring Class A supplied air as defined in OSHA Standards.
Additional $2.00 per hour for work in hazardous locations requiring supplied air (other than Class A) and any other type of respiratory equipment required for Class B or Class C as defined in OSHA Standards.

SUPPLEMENTAL BENEFITS per hour:
07/01/2025

1st term	$13.42 plus 3% of hourly wage
2nd term	$18.45 plus $4.32* plus 3% of hourly wage
3rd term	$19.37 plus $5.10* plus 3% of hourly wage
4th term	$20.28 plus $5.89* plus 3% of hourly wage
5th term	$21.20 plus $6.67* plus 3% of hourly wage

*Subject to SAME PREMIUM as overtime work

Elevator Constructor — 07/01/2025

JOB DESCRIPTION Elevator Constructor **DISTRICT** 5

ENTIRE COUNTIES
Chemung, Livingston, Monroe, Ontario, Schuyler, Seneca, Steuben, Wayne, Yates

WAGES
Per hour worked: 07/01/2025

Elevator Constructor	$ 61.52
Helper	49.22

SUPPLEMENTAL BENEFITS
Per hour:
$ 40.035
*Add 6% of regular hourly rate for all hours worked.

OVERTIME PAY
See (D, O) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 15, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16) on HOLIDAY PAGE

REGISTERED APPRENTICES
850 hours terms at the following percentage of journeyman's wage.

1st	2nd	3rd	4th	5th	6th	7th	8th
50*	55%	65%	65%	70%	70%	80%	80%

*Zero benefits paid for first term.

Supplemental Benefits per hour:
$ 40.035*

*Add 6% of regular hourly rate for all hours worked

5-27

Glazier — 07/01/2025

JOB DESCRIPTION Glazier **DISTRICT** 5

ENTIRE COUNTIES
Broome, Chemung, Chenango, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

WAGES
Per hour: 07/01/2025

Glazier	$ 30.00

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman	$ 33.15

OVERTIME PAY
See (B, E*, E2, Q**) on OVERTIME PAGE.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
1000 hour terms

Appr. 1st term	$ 20.00
Appr. 2nd term	21.00
Appr. 3rd term	22.00
Appr. 4th term	23.00
Appr. 5th term	24.00
Appr. 6th term	25.00

Appr. 7th term	26.00
Appr. 8th term	27.00

Supplemental Benefits per hour:

Appr. 1st term	$ 13.27
Appr. 2nd term	13.27
Appr. 3rd term	19.27
Appr. 4th term	19.27
Appr. 5th term	20.27
Appr. 6th term	20.27
Appr. 7th term	21.27
Appr. 8th term	21.27

5-677z3

Insulator - Heat & Frost — 07/01/2025

JOB DESCRIPTION Insulator - Heat & Frost **DISTRICT** 7

ENTIRE COUNTIES
Broome, Cayuga, Chemung, Chenango, Cortland, Herkimer, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, Otsego, Schuyler, Seneca, St. Lawrence, Tioga, Tompkins

WAGES
Per hour: 07/01/2025

Asbestos Installer	$ 43.25
Insulation Installer	43.25
(On mechanical systems only)	

SHIFT WORK
The following rates will apply on all contracting agency-mandated shifts worked:

1st Shift	$ 43.25
2nd Shift	49.74
3rd Shift	51.90

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 27.34

OVERTIME PAY
See (*B1, **K, P) on OVERTIME PAGE
*NOTE: First 10 hours on Saturday.
**NOTE: Holidays that fall on Sunday are subject to double time.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (2*,4,6,28) on HOLIDAY PAGE
*Triple time for Labor Day if worked.

REGISTERED APPRENTICES
WAGES per hour: One (1) year terms at the following percentage of Journeyworker's wage.

1st	2nd	3rd	4th
60%	70%	80%	90%

SUPPLEMENTAL BENEFITS per hour:

$ 24.09	$ 24.09	$ 27.34	$ 27.34

7-30-Syracuse

Ironworker — 07/01/2025

JOB DESCRIPTION Ironworker **DISTRICT** 6

ENTIRE COUNTIES
Broome, Cayuga, Cortland, Onondaga, Oswego, Seneca, Tioga, Tompkins

PARTIAL COUNTIES
Chenango: Only the townships of Afton, Bainbridge, Coventry, German, Greene, Guilford, Lincklaen, McDonough, Norwich, Otselic, Oxford, Pharsalia, Pitcher, Preston and Smithville.
Jefferson: Only the townships of Adams, Alexandria, Brownville, Cape Vincent, Clayton, Ellisburg, Henderson, Hounsfield, LeRay, Lorraine, Lyme, Orleans, Pamelia, Rodman, Rutland, Theresa, Watertown and Worth.

Madison: Only the townships of Cazenovia, DeRuyter, Fenner, Georgetown, Lenox, Lincoln, Nelson, Smithfield and Sullivan.
Schuyler: Only the townships of Cayuta, Catharine, Hector and Montour.
Wayne: Only the townships of Butler, Galen, Huron, Rose, Savannah and Wolcott.

WAGES
Structural, Reinforcing, Re-bar, Machinery Mover & Rigger, Ornamental & Curtain Wall, Window Wall, Pre-Glazed Metal Framed Windows Attached to Steel or Masonry Including Caulking, Fence Erector (Chain Link/Security), Sheeter/Bridge Rail, Pre-Cast Erector, Stone Derrickman, Pre-Engineered Building Erector, Welder

Per hour:	07/01/2025	07/01/2026 Additional
Ironworker	$ 37.16	$ 2.76*

* To be allocated at a later date.

SHIFT WORK
Multiple shifts mandated by the project owner. All shifts will be eight (8) hours.

1st Shift	$ 37.16	
2nd Shift	40.88	Starting times between 2PM and 7PM
3rd Shift	42.73	Starting times between 7PM and 12AM

WHEN A SINGLE IRREGULAR SHIFT IS WORKED, WITH START TIMES BASED ON SECOND AND THIRD SHIFTS, ADD 10% TO THE 1ST SHIFT WAGE RATE POSTED ABOVE.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 31.88

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: Any holiday which occurs on Saturday shall be observed on the preceding Friday. Any holiday which occurs on Sunday shall be observed the following Monday.

REGISTERED APPRENTICES
WAGES per hour: One year terms at the following rates.

1st	2nd	3rd	4th
$ 21.50	$ 23.50	$ 25.50	$ 27.50

SUPPLEMENTAL BENEFITS per hour:

1st year	$ 13.03
2nd year	21.36
3rd year	22.55
4th year	23.74

Ironworker **07/01/2025**

JOB DESCRIPTION Ironworker **DISTRICT** 5

ENTIRE COUNTIES
Chemung, Livingston, Monroe, Ontario, Yates

PARTIAL COUNTIES
Allegany: Only the Townships of Birdsall, Burns and Grove.
Genesee: Only the Townships of Batavia, Bergen, Bethany, Byron, Elba, LeRoy, Oakfield, Pavillion, Stafford.
Orleans: Only the Townships of Albion, Barre, Carlton, Clarendon, Gaines, Kendall, Murray, and Village of Holley.
Schuyler: Only the Townships of Dix, Orange, Reading and Tyron.
Steuben: Only the Townships of Addison, Avoca, Bath , Bradford, Cameron, Campbell, Caton, Cohocton, Corning, Dansville, Erwin, Hornby, Lindley, Prattsburg, Pulteney, Rathbone, Thurston, Tuscarora, Urbana, Wayland, Wayne, Wheeler, Woodhull.
Wayne: Only the Townships of Arcadia, Lyons, Macedon, Marion, Ontario, Palmyra, Sodus, Walworth, Willamson and Village of Newark.
Wyoming: Only the Townships of Castile, Covington, Middlebury, Perry.

WAGES

Per hour:	07/01/2025
Structural	$ 35.75
Reinforcing	35.75
Ornamental	35.75

Fence Erector	35.75
Welder	35.75
Sheeter	36.00
Stone Derrick Man	35.75
Mach. Mov./Rigger	35.75
Precast Concrete Erector	35.75
Window/Curtainwall Erector	35.75
Pre-Engineered Building	35.75

SHIFT WORK
When shift work is mandated either in the job specification or by the contracting agency the following premiums apply
10% for second shift work from 2:00PM - 7:00PM
15% for third shift work from 7:00PM - 12:00AM

When a single irregular shift is worked outside the standard workday with the start times based on second and third shifts, a 10% premium on hours worked applies.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman	$ 32.65

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
One year terms at the following rates.

1st.	2nd.	3rd.	4th.
$21.50	$23.50	$25.50	$27.50

Supplemental Benefits per hour:

Appr. 1st year	$ 13.98
Appr. 2nd year	21.79
Appr. 3rd year	22.90
Appr. 4th year	24.02

5-33.1

Laborer - Building — 07/01/2025

JOB DESCRIPTION Laborer - Building **DISTRICT** 2

ENTIRE COUNTIES
Broome, Chemung, Cortland, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES
Chenango: Entire County except the Townships of Sherburne, Columbus and New Berlin.
Delaware: Only the Townships of Sidney, Masonville, Walton, Tompkins, Deposit, Hancock, and Colchester.

WAGES
Per hour:

GROUP #1: Basic Laborer - excavation, concrete vibrator, power-driven buggie, demolition (including acetylene torch work) that is customarily done by a laborer

GROUP #2: Air Tool Operators, Mason Tenders

GROUP #3: Blaster, Rock Drill (compressor driven)

GROUP #4: Asbestos, Hazardous, Toxic Waste, Lead and Mold Remediation

	07/01/2025	07/01/2026 Additional
GROUP #1	$ 30.00	$ 1.25*
GROUP #2	31.00	1.25*
GROUP #3	32.00	1.25*
GROUP #4	32.00	1.25*

*To be allocated at a later date.

IMPORTANT NOTES:
- Laborer tasks on Renewable Energy and Green Energy construction work shall be paid at the appropriate Heavy & Highway rates.
- Wage and supplement rates for the operation of forklift and skid steer may be found under the classification "Operating Engineer".

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 20.20

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
When a holiday falls on Sunday, it shall be observed on the following Monday.

REGISTERED APPRENTICES
WAGES: 1000 hour terms at the following percentage of Journeyworker's wage.

1st	2nd	3rd	4th
70%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

1st term	$ 15.85
2nd term	17.10
3rd term	17.98
4th term	18.85

2-785b

Laborer - Heavy&Highway **07/01/2025**

JOB DESCRIPTION Laborer - Heavy&Highway **DISTRICT** 2

ENTIRE COUNTIES
Broome, Chemung, Cortland, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES
Chenango: Entire County except the Townships of Sherburne, Columbus, and New Berlin.
Delaware: Only the Townships of Sidney, Masonville, Walton, Tompkins, Deposit, Hancock and Colchester.

WAGES
Per hour:

GROUP A: Drill Helper, Flagman, Outboard and Hand Boats.

GROUP B: Basic Rate, Bull Float (where used for strike off only), Chain Saw, Concrete Aggregate Bin, Concrete Bootmen, Gin Buggy, Hand or Machine Vibrator, Jack Hammer, Mason Tender, Mortar Mixer, Pavement Breaker, Handlers of Steel Mesh, Small Generators for Laborers Tools, Installation of Bridge Drainage Pipe, Pipe Layers, Vibrator Type Rollers, Tamper, Drill Doctor, Water Pump Operators (1-1/2" & Single Diaphragm), Nozzle (Asphalt, Gunite, Seeding, and Sand Blasting), Laborers on Chain Link Fence Erection, Rock Splitter and Power Unit, Pusher Type Concrete Saw and all other Gas, Electric, and Air Tool Operators, Wrecking Laborer.

GROUP C: Drilling equipment - only where a separate air compressor unit supplies power, Acetylene Torch Operators, Asphalt Raker, Powder Man, Tail or Screw Operator on Asphalt Paver.

GROUP D: Blasters, Form Setters (slab steel forms on highways, roads, streets & airport runways), Stone or Granite Curb Setters.

GROUP E: Hazardous Waste defined as when an employee performs hazardous waste removal, lead abatement and removal, asbestos abatement and removal work on State and/or Federally designated waste site and were relevant State and/or Federal regulations require employees to use or wear required forms of personal protection.

	07/01/2025	07/01/2026 Additional	07/01/2027 Additional
GROUP A	$ 38.06	$ 3.40*	$ 4.20*
GROUP B	38.26	3.40*	4.20*
GROUP C	38.46	3.40*	4.20*
GROUP D	38.66	3.40*	4.20*

GROUP E	43.26	3.40*	4.20*

*To be allocated at a later date.

IMPORTANT NOTES:
- Laborer tasks on Renewable Energy and Green Energy construction work shall be paid at the appropriate Heavy & Highway rates.
- Wage and supplement rates for the operation of forklift and skid steer may be found under the classification "Operating Engineer".
- When an employee is required by the employer and/or by the material data safety sheets of a product, during its application, to wear a half or full-face replaceable cartridge respirator for more than (2) hours, then in such case said employee(s) will be paid the Group E rate for the shift.

SHIFT WORK
A single irregular work shift starting any time between 5:00 PM and 1:00 AM on governmental mandated night work shall be paid an additional $5.00 per hour.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker $ 26.35

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
- If Holiday falls on Sunday, it will be celebrated on Monday. If the Holiday falls on Saturday, it will be celebrated on Saturday.
- An Employee must work the scheduled working day before and the scheduled working day after a holiday to receive holiday pay.

REGISTERED APPRENTICES
WAGES: 1000 hour terms at the following percentage of Journeyworker's GROUP B wage:

1st	2nd	3rd	4th
70%	80%	90%	95%

SUPPLEMENTAL BENEFITS per hour:
All terms $ 26.35

2-785h

Laborer - Tunnel — 07/01/2025

JOB DESCRIPTION Laborer - Tunnel **DISTRICT** 2

ENTIRE COUNTIES
Broome, Chemung, Cortland, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES
Chenango: Entire County except the Townships of Sherburne, Columbus, and New Berlin.
Delaware: Only the Townships of Sidney, Masonville, Walton, Tompkins, Deposit, Hancock and Colchester.

WAGES
Per hour:

GROUP A: Change House Man

GROUP B: Miners and all Machine Men, Safety Miner, All Shaft work, Caisson work, Drilling, Blow Pipe, all Air Tools, Tugger, Scaling, Nipper, Guniting pot to nozzle, Bit Grinder, Signal Man (top and bottom), Concrete Man, Shield Driven Tunnels, mixed face and soft ground, liner plate tunnels in free air.

GROUP C: Blaster

GROUP D: Hazardous waste removal work on a State and/or Federally designated waste site where relevant State and/or Federal regulations require employees to use or wear required forms of personal protection.

	07/01/2025	07/01/2026 Additional	07/01/2027 Additional
Group A	$ 41.24	$ 3.40*	$ 4.20*
Group B	41.44	3.40*	4.20*
Group C	44.24	3.40*	4.20*
Group D	46.24	3.40*	4.20*

*To be allocated at a later date

IMPORTANT NOTES:
- When an employee is required by the employer and/or by the material data safety sheets of a product, during its application, to wear a half or full face replaceable cartridge respirator for more then (2) hours, then in such case said employee(s) will be paid the Group D rate for the shift.

SHIFT WORK
A single irregular work shift starting any time between 5:00 PM and 1:00 AM on governmental mandated night work shall be paid an additional $5.00 per hour.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 26.35

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE
- If Holiday falls on Sunday, it will be celebrated on Monday. If the Holiday falls on Saturday, it will be celebrated on Friday.

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
If the holiday falls on Saturday, it will be celebrated on Friday. If the holiday falls on Sunday, it will be celebrated on Monday

REGISTERED APPRENTICES
WAGES: 1000 hour terms at the following percentage of Group B wage

1st	2nd	3rd	4th
70%	80%	90%	95%

SUPPLEMENTAL BENEFITS per hour:

All Terms	$ 26.35

2-785T

Lineman Electrician — 07/01/2025

JOB DESCRIPTION Lineman Electrician **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES
A Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors, assembly of all electrical materials, conduit, pipe, or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

Crane Operators: Operation of any type of crane on line projects.
Crawler Backhoe: Operation of tracked excavator/crawler backhoe with 1/2 yard bucket or larger on line projects.
Digging Machine Operator: All other digging equipment and augering on line projects.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

NOTE: Includes Teledata Work within ten (10) feet of High Voltage Transmission Lines. Also includes digging of holes for poles, anchors, footer, and foundations for electrical equipment.

-----Below rates applicable on all overhead and underground distribution and maintenance work, and all overhead and underground transmission line work and the installation of fiber optic cable where no other construction trades are or have been involved. Includes access matting for line work.

Per hour:	07/01/2025	05/04/2026	05/03/2027	05/01/2028
Group A:				
Lineman, Technician	$ 61.56	$ 64.37	$ 66.84	$ 69.47

Crane, Crawler Backhoe	61.56	64.37	66.84	69.47
Welder, Cable Splicer	61.56	64.37	66.84	69.47
Group B:				
Digging Mach. Operator	$ 55.40	$ 57.93	$ 60.16	$ 62.52
Group C:				
Tractor Trailer Driver	$ 52.33	$ 54.71	$ 56.81	$ 59.05
Groundman, Truck Driver	49.25	51.50	53.47	55.58
Equipment Mechanic	49.25	51.50	53.47	55.58
Group D:				
Flagger	$ 33.86	$ 35.40	$ 36.76	$ 38.21

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

-----Below rates applicable on all electrical sub-stations, switching structures, fiber optic cable and all other work not defined as "Utility outside electrical work." Includes access matting for line work.

Group A:				
Lineman, Technician	$ 61.56	$ 64.37	$ 66.84	$ 69.47
Crane, Crawler Backhoe	61.56	64.37	66.84	69.47
Cable Splicer	67.72	70.81	73.52	76.42
Certified Welder,				
Pipe Type Cable	$ 64.64	$ 67.59	$ 70.18	$ 72.94
Group B:				
Digging Mach. Operator	$ 55.40	$ 57.93	$ 60.16	$ 62.52
Group C:				
Tractor Trailer Driver	$ 52.33	$ 54.71	$ 56.81	$ 59.05
Groundman, Truck Driver	49.25	51.50	53.47	55.58
Equipment Mechanic	49.25	51.50	53.47	55.58
Group D:				
Flagger	$ 33.86	$ 35.40	$ 36.76	$ 38.12

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

-----Below rates applicable on all switching structures, maintenance projects, railroad catenary install/maintenance third rail installation, bonding of rails and pipe type cable and installation of fiber optic cable. Includes access matting for line work.

Group A:				
Lineman, Tech, Welder	$ 62.94	$ 65.81	$ 68.34	$ 71.03
Crane, Crawler Backhoe	62.94	65.81	68.34	71.03
Cable Splicer	69.23	72.39	75.17	78.13
Certified Welder,				
Pipe Type Cable	66.09	69.10	71.76	74.58
Group B:				
Digging Mach. Operator	$ 56.65	$ 59.23	$ 61.51	$ 63.93
Group C:				
Tractor Trailer Driver	$ 53.50	$ 55.94	$ 58.09	$ 60.38
Groundman, Truck Driver	50.35	52.65	54.67	56.82
Equipment Mechanic	50.35	52.65	54.67	56.82
Group D:				
Flagger	$ 34.62	$ 36.20	$ 37.59	$ 39.07

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

-----Below rates applicable on all overhead and underground transmission line work & fiber optic cable where other construction trades are or have been involved. This applies to transmission line work only, not other construction. Includes access matting for line work.

Group A:				
Lineman, Tech, Welder	$ 64.18	$ 67.10	$ 69.68	$ 72.43

Crane, Crawler Backhoe	64.18	67.10	69.68	72.43
Group B:				
Digging Mach. Operator	$ 57.76	$ 60.39	$ 62.71	$ 65.19
Group C:				
Tractor Trailer Driver	$ 54.55	$ 57.04	$ 59.23	$ 61.57
Groundman, Truck Driver	51.34	53.68	55.74	57.94
Equipment Mechanic	51.34	53.68	55.74	57.94
Group D:				
Flagger	$ 35.30	$ 36.91	$ 38.32	$ 39.84

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

SHIFT WORK

THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM to 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM to 1:00 AM REGULAR RATE PLUS 17.3 %
3RD SHIFT	12:30 AM to 9:00 AM REGULAR RATE PLUS 31.4 %

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2025	05/04/2026	05/03/2027	05/01/2028
Group A	$ 31.90*	$ 32.90*	$ 34.40*	$ 35.90*
Group B	$ 27.90*	$ 28.90*	$ 30.40*	$ 31.90*
Group C	$ 27.70*	$ 28.50*	$ 29.70*	$ 30.90*
Group D	$ 27.65*	$ 28.40*	$ 29.53*	$ 30.66*

*Plus 7 % of the hourly wage paid. The 7% is based on straight time or premium time.

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE. NOTE: Double time for all emergency work designated by the Dept. of Jurisdiction.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid See (5, 6, 8, 15, 25) on HOLIDAY PAGE
Overtime See (5, 6, 8, 15, 25) on HOLIDAY PAGE
NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES

WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyworker's Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

	07/01/2025	05/04/2026	05/03/2027	05/01/2028
All terms:	$ 27.65*	$ 28.40*	$ 29.53*	$ 30.66*

*Plus 7% of the hourly wage paid. The 7% is based on straight time or premium time.

6-1249a

Lineman Electrician - Teledata — 07/01/2025

JOB DESCRIPTION Lineman Electrician - Teledata **DISTRICT** 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

For outside work, stopping at first point of attachment (demarcation).

Per hour:	07/01/2025
Cable Splicer	$ 40.81
Installer, Repairman	$ 38.73
Teledata Lineman	$ 38.73
Tech., Equip. Operator	$ 38.73
Groundman/Flagger	$ 20.53

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work, please see LINEMAN.

SHIFT WORK
THE FOLLOWING RATES APPLY WHEN THE CONTRACTING AGENCY MANDATES MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION ARE WORKED. WHEN TWO (2) OR THREE (3) SHIFTS ARE WORKED THE FOLLOWING RATES APPLY:

1ST SHIFT	REGULAR RATE
2ND SHIFT	REGULAR RATE PLUS 10%
3RD SHIFT	REGULAR RATE PLUS 15%

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 5.77 *plus 3% of the hour wage paid

*The 3% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

Lineman Electrician - Traffic Signal, Lighting — 07/01/2025

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Warren, Washington, Wayne, Wyoming, Yates

WAGES
Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors which includes, but is not limited to road loop wires; conduit and plastic or other type pipes that carry conductors, flex cables and connectors, and to oversee the encasement or burial of such conduits or pipes.

Crane Operators: Operation of any type of crane on Traffic Signal/Lighting projects.
Crawler Backhoe: Operation of tracked excavator/crawler backhoe with 1/2 yard bucket or larger on Traffic Signal/Lighting projects.
Digging Machine Operator: All other digging equipment and augering on Traffic Signal/Lighting projects.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

A flagger's duties shall consist of traffic control only.

Per hour:	07/01/2025	05/04/2026	05/03/2027	05/01/2028
Group A:				
Lineman, Technician	$ 52.86	$ 55.31	$ 57.40	$ 59.64

Crane, Crawler Backhoe	52.86	55.31	57.40	59.64
Certified Welder	55.50	58.08	60.27	62.62
Group B:				
Digging Machine	$ 47.57	$ 49.78	$ 51.66	$ 53.68
Group C:				
Tractor Trailer Driver	$ 44.93	$ 47.01	$ 48.79	$ 50.69
Groundman, Truck Driver	42.29	44.25	45.92	47.71
Equipment Mechanic	42.29	44.25	45.92	47.71
Group D:				
Flagger	$ 31.72	$ 33.19	$ 34.44	$ 35.78

Above rates are applicable for installation, testing, operation, maintenance and repair on all Traffic Control (Signal) and Illumination (Lighting) projects, Traffic Monitoring Systems, and Road Weather Information Systems. Includes digging of holes for poles, anchors, footer foundations for electrical equipment; assembly of all electrical materials or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

SHIFT WORK

THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM TO 4:30 PM	REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM	REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM	REGULAR RATE PLUS 31.4%

SUPPLEMENTAL BENEFITS

Per hour worked:

	07/01/2025	05/04/2026	05/03/2027	05/01/2028
Group A	$ 31.90*	$ 32.90*	$ 34.40*	$ 35.90*
Group B	$ 27.90*	$ 28.90*	$ 30.40*	$ 31.90*
Group C	$ 27.70*	$ 28.50*	$ 29.70*	$ 30.90*
Group D	$ 27.65*	$ 28.40*	$ 29.53*	$ 30.66*

* Plus 7% of the hourly wage paid. The 7% is based on straight time or premium time.

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE. NOTE: Double time for all emergency work designated by the Dept. of Jurisdiction.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (5, 6, 8, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25) on HOLIDAY PAGE
NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES

WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyworker's Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

	07/01/2025	05/04/2026	05/03/2027	05/01/2028
All terms:	$ 27.65*	$ 28.40*	$ 29.53*	$ 30.66*

* Plus 7% of the hourly wage paid. The 7% is based on straight time or premium time.

6-1249a-LT

Lineman Electrician - Tree Trimmer **07/01/2025**

JOB DESCRIPTION Lineman Electrician - Tree Trimmer **DISTRICT** 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES

Applies to line clearance, tree work and right-of-way preparation on all new or existing energized overhead or underground electrical, telephone and CATV lines. This also includes stump removal near underground energized electrical lines including telephone and CATV lines.

Per hour:	07/01/2025	01/04/2026	01/03/2027
Tree Trimmer	$ 33.18	$ 34.67	$ 36.23
Equipment Operator	29.35	30.67	32.05
Equipment Mechanic	29.35	30.67	32.05
Truck Driver	23.85	24.93	26.05
Groundman	19.64	20.53	21.45
Flagger	15.50	16.20	16.93

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2025	01/04/2026	01/03/2027
Journeyworker	$ 10.98*	$ 11.23*	$ 11.48*

* Plus 4.5% of the hourly wage paid. The 4.5% is based on straight time rate or premium rate.

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE

WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE

NOTE: All paid holidays falling on a Saturday shall be observed on the preceding Friday. All paid holidays falling on a Sunday shall be observed on the following Monday.

6-1249TT

Mason - Building — 07/01/2025

JOB DESCRIPTION Mason - Building **DISTRICT** 5

ENTIRE COUNTIES

Chemung, Schuyler, Steuben

PARTIAL COUNTIES

Allegany: Only the Townships of Alfred, Almond, Andover and Burns.

WAGES

Per Hour:	07/01/2025
Building:	
Bricklayer, Cement	$ 33.26
Mason, Plasterer, Stone	
Mason, Tuck Pointer	

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	$ 31.66

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following wage:

1st	2nd	3rd	4th
$ 20.29	$ 25.28	$ 27.36	$ 29.93

Supplemental benefits per hour:

1st	2nd	3rd	4th
$ 26.92	$27.82	$ 29.69	$ 31.05

5-3b - Co - Z2

Mason - Heavy&Highway 07/01/2025

JOB DESCRIPTION Mason - Heavy&Highway **DISTRICT** 5

ENTIRE COUNTIES
Allegany, Broome, Chautauqua, Chemung, Chenango, Cortland, Delaware, Genesee, Livingston, Monroe, Ontario, Orleans, Otsego, Schuyler, Seneca, Steuben, Tioga, Tompkins, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Cattaraugus: Enitre county except in the Township of Perrysburg and the Village of Gowanda only the Bricklayer classification applies.
Erie: Only the Bricklayer classification applies.
Niagara: Only the Bricklayer classification applies.

WAGES

Per hour:	07/01/2025
Heavy & Highway:	
Cement Mason	$ 38.63
Bricklayer	38.63

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman	$ 26.28

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

1500 hour terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
50%	60%	70%	80%

Supplemental benefits per hour:

1st term	$ 15.40
2nd term	$ 24.62
3rd term	$ 25.04
4th term	$ 25.45

5-3h

Mason - Tile Finisher 07/01/2025

JOB DESCRIPTION Mason - Tile Finisher **DISTRICT** 5

ENTIRE COUNTIES
Broome, Chemung, Chenango, Cortland, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES
Albany: Towns of Alfred, Almond, Andover and Burns in Allegany County

WAGES

Wages	
Per hour:	07/01/2025
Building:	
Marble, Slate, Terrazzo and Tile Finisher	$ 32.45

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman $ 23.52

OVERTIME PAY
See (B,E,E2*,Q) on OVERTIME PAGE
*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

One year terms at the following wage:

1st	2nd	3rd
$ 19.47	$ 22.72	$ 25.96

Supplemental benefits per hour:

1st	2nd	3rd
$ 15.12	$ 15.72	$ 20.37

5-3TF - Z4

Mason - Tile Setter — 07/01/2025

JOB DESCRIPTION Mason - Tile Setter **DISTRICT** 5

ENTIRE COUNTIES
Broome, Chemung, Chenango, Cortland, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES
Allegany: Towns of Alfred, Almond, Andover and Burns.

WAGES
Wages
Per Hour: 07/01/2025
Building:
Marble, Slate, Terrazzo and Tile Setter $ 34.69

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman $ 27.06

OVERTIME PAY
See (B,E,E2*,Q) on OVERTIME PAGE
*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

One year terms at the following wage:

1st	2nd	3rd	4th
$ 20.81	$ 24.28	$ 27.75	$ 31.22

Supplemental benefits per hour:

1st	2nd	3rd	4th
$ 15.59	$ 16.26	$ 25.70	$ 26.38

5-3TS - Z4

Millwright — 07/01/2025

JOB DESCRIPTION Millwright **DISTRICT** 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES

THE FOLLOWING RATE APPLIES TO ANY GAS/STEAM TURBINE AND OR RELATED COMPONENT WORK, INCLUDING NEW INSTALLATIONS OR MAINTENANCE AND ANY/ALL WORK PERFORMED WITHIN THE PROPERTY LIMITS OF A NUCLEAR FACILITY.

Per hour:	07/01/2025
Millwright - Power Generation	$ 47.00

NOTE: ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):
- Certified Welders shall receive an additional $1.75 per hour provided they are directed to perform Certified Welding.
- If a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) is required, then that employee shall receive an additional $1.50 per hour.
- An employee performing the work of a machinist shall receive an additional $2.00 per hour. For the purposes of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional $1.00 per hour.

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyworker	$ 28.45*

*NOTE: Subject to OT premium

OVERTIME PAY

See (B, E, E2, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

NOTE: Any holiday that falls on Sunday shall be observed the following Monday. Any holiday that falls on Saturday shall be observed the preceding Friday.

REGISTERED APPRENTICES

WAGES per hour: One year terms at the following percentage of Journeyworker's wage:

Appr. 1st year	65%*
Appr. 2nd year	75%*
Appr. 3rd year	80%*
Appr. 4th year	90%*

*NOTE: Additional premium for the following work listed below:

Certified Welder	$ 1.75
Hazardous Waste Work	1.50
Machinist	2.00
Underground (500' and below)	1.00

SUPPLEMENTAL BENEFITS per hour:

Appr. 1st year	$ 11.95
Appr. 2nd year	23.50
Appr. 3rd year	25.15
Appr. 4th year	26.80

6-1163Power

Millwright 07/01/2025

JOB DESCRIPTION Millwright **DISTRICT** 6

ENTIRE COUNTIES

Chemung, Cortland, Livingston, Monroe, Ontario, Orleans, Schuyler, Steuben, Tompkins, Wayne, Wyoming

WAGES

Per hour:	07/01/2025
Building	$ 37.89

Heavy & Highway	41.39

NOTE: ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):
- Certified Welders shall receive an additional $1.75 per hour provided they are directed to perform Certified Welding.
- On Building projects, If a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) is required, then that employee shall receive an additional $1.50 per hour.
- H/H work performed on hazardous waste sites where employees are required to wear protective gear shall receive an additional $2.00 per hour over the Millwright H/H rate for all hours worked on the day protective gear was worn.
- An employee performing the work of a machinist shall receive an additional $2.00 per hour. For the purposes of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional $1.00 per hour.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 27.29

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: Any holiday that falls on Sunday shall be observed the following Monday. Any holiday that falls on Saturday shall be observed the preceding Friday.

REGISTERED APPRENTICES
WAGES per hour: One year terms at the following percentage of Journeyworker's wage:

Appr. 1st year	65%*
Appr. 2nd year	75%*
Appr. 3rd year	80%*
Appr. 4th year	90%*

*NOTE: Additional premium for the following work listed below:

Certified Welder	$ 1.75
Hazardous Waste (Bldg)	1.50
Hazardous Waste (H/H)	2.00
Machinist	2.00
Underground (500' and below)	1.00

SUPPLEMENTAL BENEFITS per hour:

Appr. 1st year	$ 11.95
Appr. 2nd year	22.69
Appr. 3rd year	24.22
Appr. 4th year	25.76

6-1163

Operating Engineer - Building — 07/01/2025

JOB DESCRIPTION Operating Engineer - Building **DISTRICT** 7

ENTIRE COUNTIES
Allegany, Chemung, Livingston, Monroe, Ontario, Schuyler, Steuben, Wayne, Yates

PARTIAL COUNTIES
Genesee: Only that portion of the county that lies east of a line drawn down the center of Route 98, and the entirety of the City of Batavia.

WAGES
---In the event that equipment listed below is operated by robotic control, the classification covering the operation will be the same as if manually operated.
---If a second employee is required by the employer for operation of any covered machine, they shall be an Engineer Class 3.

CLASS A1*: All Cranes (A1 Includes Boom Trucks, Cableway, Cherry Picker, Derrick, Dragline, Dredge, Overhead Crane, Pile Driver, Tower Crane**, Truck Crane, Whirlies).

CLASS 1: Air Tugger; All terrain telescoping material handler; Barber Green and similar type machines; Clamshell; Dragline Shovel and similar machines over three-eighths cu. yd. capacity (Factory rating); Carrier mounted Backhoes that swing 360 degrees; Big Generator Plant Hoist (on steel erection); Bridge Crane (all types); Caisson auger and similar type machine; Dredge; Excavator all purpose hydraulically operated; Forklift (with Factory rating of 15' or more of lift); Hoist (on steel erection); Hydraulic/Krupp Drill; Mucking Machines; Remote controlled Excavator with attachments (Brokk type or similar); Ross Carrier (and similar type); Three-Drum Hoist (when all three drums are in use).

CLASS 2: A-Frame Truck; Backfilling Machine; Backhoe (tractor mounted); Belt Crete (and similar type machines); Bituminous spreading machine (3/8 yd. capacity or less factory rating); Bulldozer; Carry-all type Scraper; Compressors (four (4) not to exceed 2000 CFM combined capacity) or (three (3) or less with more than 1200 CFM but not to exceed 2000 CFM); Concrete Mixer; Concrete Placer; Concrete Pump; Mini Locomotives (all types); Elevating Grader; Elevator; Fine Grade and Finish Rollers; Fine Grade Machines (all kinds); Forklift with factory rating of less than 15' of lift; Front End Loader; Gunite Pumping Machine; High Pressure Boiler; Hoist (1 or 2 drums); Maintenance Engineer (Mechanic); Mechanical Slurry Machine (all kinds); Mega Mixers and similar type machines; Motor Grader; Pavement Grinder; Post Hole Digger; Pumps (regardless of motive power) no more than four (4) in number not to exceed twenty (20) inches in total capacity (not to include single electric pumps up to and including four (4) inches); Shot Crete Pumping Machine; Side Boom; Tractor; Skid Steer Loader (including attachments); Stoner Crusher; Tournadozer and similar types; Tournapull and similar types; Trenching Machines; Welder; Well Drill; Well Point System.

CLASS 3: Compressors - any combination (Not to exceed three (3) pieces of equipment or not to exceed 1200 CFM combined capacity); Fireman; Longitudinal Float; Mechanical Heater; Pumps (regardless of motive power, no more than three (3) in number, not to exceed twelve (12) inches total capacity); Roller (fill and grade); Rubber Tired Tractor; Welding Machine (except gas driven up to 300 amp); Mechanical Conveyor (over 12 ft. in length); Junior Engineers/Oilers.

Per hour:	07/01/2025
CLASS A1*	$ 47.64
CLASS 1	43.14
CLASS 2	42.34
CLASS 3	39.64

Additional $2.50 per hour if work requires Personal Protective Equipment for hazardous waste site activities with a level C or over rating.

(*) TONNAGE PREMIUMS:
All cranes up to 64 tons capacity - A1 rate
All cranes 65 ton to 110 ton capacity - A1 rate plus $ 1.50
All cranes 111 ton to 199 ton capacity - A1 rate plus $ 2.00
All cranes 200 ton to 399 ton capacity - A1 rate plus $ 3.00
All cranes 400 ton to 599 ton capacity - A1 rate plus $ 4.00
All cranes 600 ton to 799 ton capacity - A1 rate plus $ 5.00
All cranes 800 ton to 999 ton capacity - A1 rate plus $ 6.00
All cranes 1000 ton capacity and over - A1 rate plus $ 7.00

(**) Tower Cranes - A1 rate plus $2.50 (no tonnage premiums)

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 35.61

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (5, 6) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES: One year terms at the following percentage of the Journeyworker's wage listed below.

1st year	60% of CLASS 3 rate
2nd year	65% of CLASS 3 rate
3rd year	75% of CLASS 2 rate
4th year	80% of CLASS 1 rate

Additional $2.50 per hour if work requires Personal Protective Equipment for hazardous waste site activities with a level C or over rating.

SUPPLEMENTAL BENEFITS per hour: Same as Journeyworker

7-158-832B

Operating Engineer - Building - Excavating & Paving **07/01/2025**

JOB DESCRIPTION Operating Engineer - Building - Excavating & Paving **DISTRICT** 7

ENTIRE COUNTIES
Allegany, Chemung, Livingston, Monroe, Ontario, Schuyler, Steuben, Wayne, Yates

PARTIAL COUNTIES
Genesee: Only that portion of the county that lies east of a line drawn down the center of Route 98, and the entirety of the City of Batavia.

WAGES
NOTE: The following rates apply to "Site Work" which may include site preparation, grading, underground work, athletic fields, paving, skateboard parks and all other work outside the footprint of any building.

This wage schedule does not cover Hazardous Waste Removal work, See Heavy/Highway schedule (7-158-832H)

CLASS A: All terrain Telescoping Material Handler; Asphalt Paver; Automatic Fine Grader; Backhoe (except tractor mounted-rubber tired); Blacktop Plant (automated); Cableway; Caisson Auger; Central Mix Concrete Plant (automated); Cherry Picker (over 5 ton capacity); Crane; Cranes and Derricks (steel erection); Dragline; Dual Drum Paver; Excavator (all purpose-hydraulically operated); Front End Loader (4 cu. yd. and over); Hoist (two or three drum); Hydro-Axe; Hydraulic/Krupp Drill; Pile Driver; Power Grader (with elevating loader attachment); Quarry Master (or equivalent); Remote controlled Excavator with attachments; Shovel; Slip Form Paver (if a second man is needed, he shall be an Oiler); Tractor Drawn Belt-Type Loader; Truck Crane; Tunnel Shovel.

CLASS B: Articulated off-road Material Hauler; Backhoe (tractor mounted-rubber tired); Bituminous Spreader and Mixer; Blacktop Plant (non-automated); Boring Machine; Cage Hoist; Central Mix Plant (non-automated) and all Concrete Batching Plants; Cherry Picker (5 tons and under); Compressor (4 or less exceeding 2,000 c.f.m. combined capacity); Concrete Paver (over 16'); Concrete Pump; Crusher; Drill Rigs (tractor mounted); Front-end Loader (under 4 cu. yd.); Hi-pressure Boiler (15 lbs. and over); Hoist (one drum); Kolman Plant Loader and similar type loaders (if Employer requires another man to clean the screen or to maintain the equipment, he shall be an Oiler); Maintenance Engineer; Maintenance Grease Man; Mechanical Slurry Machine; Mixer for stabilized base (self-propelled); Monorail Machine; Plant Engineer; Power Broom; Power Grader; Pump Crete, Ready Mix Concrete Plant; Road Widener; Roller (all above sub-grade); Side Boom; Skid Steer Loader (including attachments); Tractor Scraper; Tractor with Dozer and/or Pusher; Trencher; Vacuum Truck; Winch.

CLASS C: Compressors (4 not to exceed 2,000 c.f.m. combined capacity) or (3 or less with more than 1,200 c.f.m. but not to exceed 2,000 c.f.m.); Compressors (any size but subject to other provisions for compressors), Dust Collectors, Generators, Welding Machines (four of any type or combination); Concrete Pavement Spreaders and Finishers; Conveyor; Drill (core); Drill (well); Electric Pump used in conjunction with Well Point Systems; Farm Tractor with accessories; Fine Grade Machine; Fork Lift; Gunite Machine; Hammers (Hydraulic self-propelled); Locomotive; Post Hole Digger and Post Driver; Pumps (regardless of motive power, not more than 4 in number not to exceed 20" in total capacity); Submersible Electric Pumps (when used in lieu of well Points); Tractor with towed accessories; Vibrator Compactor; Vibro Tamp; Well Point.

CLASS D: Compressor (any size, but subject to other provisions for compressors), Dust Collectors, Generator, Welding machines (three or less of any type or combination); Concrete Mixer (16' and under); Concrete Saw (self-propelled); Form Tamper; Mulching Machine; Power Heaterman; Pumps (regardless of motive power no more than 3 in number not to exceed 12" in total capacity); Revinius Widener; Steam Cleaner; Tractor.

CLASS E: Junior Engineer/Oiler

Per hour:	07/01/2025
CLASS A	$ 41.26
CLASS B	40.79
CLASS C	40.10
CLASS D	36.61
CLASS E	35.38

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 35.26

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

7-158-832BEX

Operating Engineer - Heavy&Highway **07/01/2025**

JOB DESCRIPTION Operating Engineer - Heavy&Highway **DISTRICT** 7

ENTIRE COUNTIES
Allegany, Chemung, Livingston, Monroe, Ontario, Schuyler, Steuben, Wayne, Yates

PARTIAL COUNTIES

Genesee: Only that portion of the county that lies east of a line drawn down the center of Route 98, and the entirety of the City of Batavia.

WAGES

NOTE:
---In the event that equipment listed below is operated by robotic control, the classification covering the operation will be the same as if manually operated.
---If a second employee is required by the employer for operation of any covered machine, they shall be an Engineer Class C.

CLASS A1*: All Cranes that require a NYS Crane License (Boom Truck, Cherry Picker, Derrick, Dragline, Overhead Crane (Gantry or Straddle Type), Pile Driver, Tower Crane (including self erecting)**, Truck Crane).

CLASS A: Asphalt Curb Machine (self-propelled, slipform); Asphalt Paver; Automated Concrete Spreader (CMI type); Automatic Fine Grader; Backhoe (except tractor mounted, rubber tired); Backhoe Excavator, Full Swing (CAT 212 or similar type); Back Filling Machine; Belt Placer (CMI type); Blacktop Plant (automated); Blacktop Roller; Bulldozer (being operated with active GPS); Cableway; Caisson Auger; Central Mix Concrete Plant (automated); Concrete Curb Machine (self-propelled, slipform); Concrete Pump; Cranes - Listed in A1 that do not require a NYS Crane License; Directional Boring/Drilling Machine; Dredge; Dual Drum Paver; Excavator (all purpose-hydraulic, Gradall or similar); Front End Loader (4 cu. yd. & over); Head Tower (Sauerman or equal); Hoist (two or three drum); Holland Loader; Maintenance Engineer; Mine Hoist; Mucking Machine or Mole; Pavement Breaker (SP Wertgen; PB-4 and similar type); Profiler/Milling Machine (over 105 h.p.); Power Grader; Quad 9; Quarry Master (or equivalent); Scraper; Shovel; Side Boom; Slip Form Paver; Tractor Drawn Belt-Type Loader; Truck or Trailer Mounted Chipper (self-feeder); Tug Operator (manned rented equipment excluded); Tunnel Shovel.

CLASS B: Backhoe (tractor mounted, rubber tired); Bituminous Recycler Machine; Bituminous Spreader and Mixer; Blacktop Plant (non-automated); Blast or Rotary Drill (truck or tractor mounted); Boring Machine; Bridge Deck Finishing Machine; Brokk; Cage Hoist; Central Mix Plant (non-automated) and All Concrete Batching Plants; Concrete Paver (over 16'); Crawler Drill (self-contained); Crusher; Diesel Power Unit; Drill Rigs (truck or tractor mounted); Front End Loader (under 4 cu. yd.); Greaseman - Lubrication Engineer; HiPressure Boiler (15 lbs & over); Hoist (one drum); Hydro-Axe; Kolman Plant Loader & similar type loaders; Locomotive; Material Handling Knuckle Boom; Mini-Excavator (under 18,000lbs); Mixer (for stabilized base, self-propelled); Monorail Machine; Profiler/Milling Machine (105 h.p. and under); Plant Engineer; Prentice Loader; Pug Mill; Pump Crete; Ready Mix Concrete Plant; Refrigeration Equipment (for soil stabilization); Road Widener; Roller (all above subgrade); Sea Mule; Self-contained ride-on Rock Drill (excluding Air-Track type drill); Skidder; Tractor with Dozer and/or Pusher; Trencher; Tugger Hoist; Vacuum Machine (mounted or towed); Vermeer Saws (ride-on, any size or type); Welder; Winch and Winch Cat; Work Boat Operator including L.C.M.'s.

CLASS C: "A" Frame Winch Hoist (On Truck); Aggregate Plant; Articulated Heavy Hauler; Asphalt or Concrete Grooving Machine (ride-on); Ballast Regulator (ride-on); Bituminous Heater (self-propelled); Boat (powered); Boiler (used in conjunction with production); Cement & Bin Operator; Compressors***; Concrete Pavement Spreader and Finisher; Concrete Paver or Mixer (16' & under); Concrete Saw (self-propelled); Conveyor; Deck Hand; Directional Boring/Drilling Machine Locator; Drill (Core); Drill (Well); Dust Collectors***; Electric Pump When Used in Conjunction with Well Point System; Farm Tractor with accessories; Fine Grade Machine; Fireman; Fork Lift; Form Tamper; Generators***; Grout Pump; Gunite Machine; Hammers (hydraulic self-propelled); Heaters***; Hydra-Spiker (ride-on); Hydraulic Pump (jacking system); Hydro-Blaster (water); Light Plants***; Mulching Machine; Oiler; Parapet Concrete or Pavement Grinder; Post Hole Digger (excluding hand-held); Post Driver; Power Broom (towed); Power Heaterman; Power Sweeper; Pumps***; Revinius Widener; Roller (subgrade & fill); Scarifier (ride-on); Shell Winder; Skid Steer Loader (Bobcat or similar); Span Saw (ride-on); Steam Cleaner; Tamper (ride-on); Tie Extractor (ride-on); Tie Handlers (ride-on); Tie Inserters (ride-on); Tie Spacers (ride-on); Tire Repair; Track Liner (ride-on); Tractor; Tractor (with towed accessories); Vacuum Machine (self-propelled); Vibratory Compactor; Vibro Tamp; Welding Machines***; Well Point.

***CLASS C NOTE: Considered Hands-Off(unmanned). Includes only operation and maintenance of the equipment.

Per hour:	07/01/2025
CLASS A1*	$ 58.38
CLASS A	55.38
CLASS B	54.68
CLASS C	51.81

(*) TONNAGE PREMIUMS:
All cranes up to 64 ton capacity - A1 rate
All cranes 65 ton to 110 ton capacity - A1 rate plus $ 1.50
All cranes 111 ton to 199 ton capacity - A1 rate plus $ 2.00
All cranes 200 ton to 399 ton capacity - A1 rate plus $ 3.00
All cranes 400 ton to 599 ton capacity - A1 rate plus $ 4.00
All cranes 600 ton to 799 ton capacity - A1 rate plus $ 5.00
All cranes 800 ton to 999 ton capacity - A1 rate plus $ 6.00
All cranes 1000 ton capacity and over - A1 rate plus $ 7.00

(**) Tower Cranes - A1 rate plus $3.00 (no tonnage premiums apply)

- Cranes in Luffer Configuration - A1 rate plus $ 5.00.
- Cranes with external ballast (Tray or Wagon) - A1 rate plus $ 5.00.

Additional $2.50 per hour for hazardous waste removal work on a State and/or Federally designated waste site which requires employees to wear Level C or above forms of personal protection.

SHIFT WORK
Additional $2.50 per hour for all employees who work a single irregular work shift starting from 5:00 PM to 1:00 AM that is mandated by the Contracting Agency.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 36.03

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: If a holiday falls on Sunday, it will be celebrated on Monday.

REGISTERED APPRENTICES
WAGES: (1000) hour terms at the following percentage of Journeyworker's CLASS B wage.

1st term	60%
2nd term	70%
3rd term	80%
4th Term	90%

Additional $2.50 per hour for hazardous waste removal work on a State and/or Federally designated waste site which requires employees to wear Level C or above forms of personal protection.

SUPPLEMENTAL BENEFITS per hour: Same as Journeyworker

7-158-832H

Operating Engineer - Survey Crew — 07/01/2025

JOB DESCRIPTION Operating Engineer - Survey Crew **DISTRICT** 12

ENTIRE COUNTIES
Albany, Allegany, Broome, Cayuga, Chemung, Chenango, Clinton, Columbia, Cortland, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Oneida, Onondaga, Ontario, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Yates

PARTIAL COUNTIES
Dutchess: The northern portion of the county from the northern boundary line of the City of Poughkeepsie, north.
Genesee: Only the portion of the county that lies east of a line down the center of Route 98 to include all area that lies within the City of Batavia.

WAGES
These rates apply to Building, Tunnel and Heavy Highway.

Per hour:
SURVEY CLASSIFICATIONS:

Party Chief - One who directs a survey party.
Instrument Person - One who operates the surveying instruments.
Rod Person - One who holds the rods and assists the Instrument Person.

	07/01/2025
Party Chief	$ 52.91
Instrument Person	48.67
Rod Person	36.29
Additional $3.00/hr. for Tunnel Work	
Additional $2.50/hr. for Hazardous Work Site	

SUPPLEMENTAL BENEFITS
Per hour worked:

Journeyman	$ 30.10

OVERTIME PAY
See (B, E, P, *X) on OVERTIME PAGE
*Note: $25.10/Hr. Only for "ALL" premium hours paid when worked.

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES: 1000 hour terms based on the Percentage of Rod Persons Wage:

	07/01/2025
0-1000	60%
1001-2000	70%
2001-3000	80%

SUPPLEMENTAL BENEFIT per hour worked:

0-1000	$ 21.88 / PHP $18.03
1001-2000	24.90 / " 20.45
2001-3000	27.93/ " 22.93

NOTE: PHP is premium hours paid when worked.

12-158-545 D.H.H.

Operating Engineer - Survey Crew - Consulting Engineer — 07/01/2025

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer **DISTRICT** 12

ENTIRE COUNTIES
Albany, Allegany, Broome, Cayuga, Chemung, Chenango, Clinton, Columbia, Cortland, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Oneida, Onondaga, Ontario, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Yates

PARTIAL COUNTIES
Dutchess: The northern portion of the county from the northern boundary line of the City of Poughkeepsie, north.
Genesee: Only the portion of the county that lies east of a line down the center of Route 98 to include all area that lies within the City of Batavia.

WAGES
These rates apply to feasibility and preliminary design surveying, line and grade surveying for inspection or supervision of construction when performed under a Consulting Engineer Agreement.

Per hour:
SURVEY CLASSIFICATIONS:

Party Chief - One who directs a survey party.
Instrument Person - One who operates the surveying instruments.
Rod Person - One who holds the rods and assists the Instrument Person.

	07/01/2025
Party Chief	$ 52.91
Instrument Person	48.67
Rod Person	36.29

Additional $3.00/hr. for Tunnel Work.
Additional $2.50/hr. for EPA or DEC certified toxic or hazardous waste work.

SUPPLEMENTAL BENEFITS
Per hour worked:

Journeyman	$ 30.10

OVERTIME PAY
See (B, E, Q, *X) on OVERTIME PAGE
*Note: $25.10/Hr. Only for "ALL" premium hours paid when worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES: 1000 hour terms based on percentage of Rod Persons Wage:

	07/01/2025
0-1000	60%

1001-2000	70%
2001-3000	80%

SUPPLEMENTAL BENEFIT per hour worked:

0-1000	$ 21.88 / PHP $18.03
1001-2000	$ 24.90 / " 20.45
2001-3000	$ 27.93 / " 22.93

NOTE: PHP is premium hours paid when worked.

12-158-545 DCE

Operating Engineer - Tunnel — 07/01/2025

JOB DESCRIPTION Operating Engineer - Tunnel **DISTRICT** 7

ENTIRE COUNTIES
Albany, Allegany, Broome, Cayuga, Chemung, Chenango, Clinton, Columbia, Cortland, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Oneida, Onondaga, Ontario, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Yates

PARTIAL COUNTIES
Dutchess: Northern part of Dutchess, to the northern boundary line of the City of Poughkeepie, then due east to Route 115 to Bedell Road, then east along Bedell Road to VanWagner Road, then north along VanWagner Road to Bower Road, then east along Bower Road to Rte. 44 east to Rte. 343, then along Rte. 343 east to the northern boundary of the Town of Dover Plains and east along the northern boundary of the Town of Dover Plains, to the borderline of the State of Connecticut.
Genesee: Only that portion of the county that lies east of a line drawn down the center of Route 98 and the entirety of the City of Batavia.

WAGES
CLASS A: Automatic Concrete Spreader (CMI Type); Automatic Fine Grader; Backhoe (except tractor mounted, rubber tired); Belt Placer (CMI Type); Blacktop Plant (automated); Cableway; Caisson Auger; Central Mix Concrete Plant (automated); Concrete Curb Machine (self-propelled slipform); Concrete Pump (8" or over); Dredge; Dual Drum Paver; Excavator; Front End Loader (4 cu. yd & over); Gradall; Head Tower (Sauerman or Equal); Hoist (shaft); Hoist (two or three Drum); Log Chipper/Loader (self-feeder); Maintenance Engineer (shaft and tunnel); any Mechanical Shaft Drill; Mine Hoist; Mining Machine(Mole and similar types); Mucking Machine or Mole; Overhead Crane (Gantry or Straddle Type); Pile Driver; Power Grader; Remote Controlled Mole or Tunnel Machine; Scraper; Shovel; Side Boom; Slip Form Paver (If a second man is needed, they shall be an Oiler); Tripper/Maintenance Engineer (shaft & tunnel); Tractor Drawn Belt-Type Loader; Tug Operator (manned rented equipment excluded); Tunnel Shovel.

CLASS B: Automated Central Mix Concrete Plant; Backhoe (topside); Backhoe (track mounted, rubber tired); Backhoe (topside); Bituminous Spreader and Mixer, Blacktop Plant (non-automated); Blast or Rotary Drill (truck or tractor mounted); Boring Machine; Cage Hoist; Central Mix Plant(non-automated); all Concrete Batching Plants; Compressors (4 or less exceeding 2,000 c.f.m. combined capacity); Concrete Pump; Crusher; Diesel Power Unit; Drill Rigs (tractor mounted); Front End Loader (under 4 cu. yd.); Grayco Epoxy Machine; Hoist (One Drum); Hoist (2 or 3 drum topside); Knuckle Boom material handler; Kolman Plant Loader & similar type Loaders (if employer requires another person to clean the screen or to maintain the equipment, they shall be an Oiler); L.C.M. Work Boat Operator; Locomotive; Maintenance Engineer (topside); Maintenance Grease Man; Mixer (for stabilized base-self-propelled); Monorail Machine; Plant Engineer; Personnel Hoist; Pump Crete; Ready Mix Concrete Plant; Refrigeration Equipment (for soil stabilization); Road Widener; Roller (all above sub-grade); Sea Mule; Shotcrete Machine; Shovel (topside); Tractor with Dozer and/or Pusher; Trencher; Tugger Hoist; Tunnel Locomotive; Vacuum Machine (mounted or towed); Welder; Winch; Winch Cat.

CLASS C: A Frame Truck; All Terrain Telescoping Material Handler; Ballast Regulator (ride-on); Compressors (4 not to exceed 2,000 c.f.m. combined capacity; or 3 or less with more than 1200 c.f.m. but not to exceed 2,000 c.f.m.); Compressors ((any size, but subject to other provisions for compressors), Dust Collectors, Generators, Pumps, Welding Machines, Light Plants (4 or any type combination)); Concrete Pavement Spreaders and Finishers; Conveyor; Drill (core); Drill (well); Electric Pump used in conjunction with Well Point System; Farm Tractor with Accessories; Fine Grade Machine; Fork Lift; Grout Pump (over 5 cu. ft.); Gunite Machine; Hammers (hydraulic-self-propelled); Hydra-Spiker (ride-on); Hydra-Blaster (water); Hydro-Blaster; Motorized Form Carrier; Post Hole Digger and Post Driver; Power Sweeper; Roller grade & fill); Scarifer (ride-on); Span-Saw (ride-on); Submersible Electric Pump (when used in lieu of well points); Tamper (ride-on); Tie-Extractor (ride-on), Tie Handler (ride-on), Tie Inserter (ride-on), Tie Spacer (ride-on); Track Liner (ride-on); Tractor with towed accessories; Vibratory Compactor; Vibro Tamp, Well Point.

CLASS D: Aggregate Plant; Cement & Bin Operator; Compressors (3 or less not to exceed 1,200 c.f.m. combined capacity); Compressors ((any size, but subject to other provisions for compressors), Dust Collectors, Generators, Pumps, Welding Machines, Light Plants (3 or less or any type or combination)); Concrete Saw (self-propelled); Form Tamper; Greaseman; Hydraulic Pump (jacking system); Junior Engineer; Light Plants; Mulching Machine; Oiler; Parapet Concrete or Pavement Grinder; Power Broom (towed); Power Heaterman (when used for production); Revinius Widener; Shell Winder; Steam Cleaner; Tractor.

Per hour:	07/01/2025
CLASS A	$ 58.44
CLASS B	57.22
CLASS C	54.43
CLASS D	51.42

Additional $5.00 per hour for Hazardous Waste Work on a state or federally designated hazardous waste site where the Operating Engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin and eye protection.

CRANES:
Crane 1: All cranes, including self-erecting.
Crane 2: All Lattice Boom Cranes and all cranes with a manufacturer's rating of fifty (50) ton and over.
Crane 3: All hydraulic cranes and derricks with a manufacturer's rating of forty nine (49) ton and below, including boom trucks.

Crane 1	$ 62.44
Crane 2	61.44
Crane 3	60.44

SUPPLEMENTAL BENEFITS
Per hour:

$ 25.90
+ 10.10*

* This portion of the benefits subject to SAME PREMIUM as shown for overtime wages.

OVERTIME PAY
See (B, B2, E, Q, X) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: If a holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES
WAGES:(1000) hours terms at the following percentage of Journeyworker's Class B wage.

1st term	60%
2nd term	65%
3rd term	70%
4th term	75%

SUPPLEMENTAL BENEFITS per hour: Same as Journeyworker

7-158-832TL.

Painter 07/01/2025

JOB DESCRIPTION Painter **DISTRICT** 3

ENTIRE COUNTIES
Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Cortland, Delaware, Erie, Genesee, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Wayne, Wyoming, Yates

WAGES

Per hour:	07/01/2025	05/01/2026 Additional
Bridge	$ 46.19	$ 2.50
Tunnel	46.19	
Tank*	44.19	

For Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

*Tank rate applies to indoor and outdoor tanks, tank towers, standpipes, digesters, waste water treatment tanks, chlorinator tanks, etc. Covers all types of tanks including but not limited to steel tanks, concrete tanks, fiberglass tanks, etc.

SHIFT WORK
Note an additional $1.50 per hour is required when the contracting agency or project specification requires any shift to start prior to 6:00am or after 12:00 noon.

SUPPLEMENTAL BENEFITS
Per hour:

$ 31.51

OVERTIME PAY
Exterior work only See (B, E2, E4, F, R) on OVERTIME PAGE.
All other work See (B, F, R) on OVERTIME PAGE.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

750 hour terms at the following wage:

1st	2nd	3rd	4th	5th	6th
$ 24.00	$ 26.00	$ 28.00	$ 30.00	$ 34.00	$ 38.00

Supplemental benefits per hour:

1st	2nd	3rd	4th	5th	6th
$ 6.60	$ 6.95	$ 7.30	$ 7.65	$ 8.00	$ 8.35

3-4-Bridge, Tunnel, Tank

Painter 07/01/2025

JOB DESCRIPTION Painter **DISTRICT** 2

ENTIRE COUNTIES
Chemung, Schuyler

PARTIAL COUNTIES
Steuben: Only the Townships of Addison, Bath, Bradford, Cameron, Campbell, Caton, Corning, Erwin, Hornby, Lindley, Rathbone and Thurston

WAGES
Per hour:

	07/01/2025	05/01/2026 Additional
Painter	$ 26.13	$ 2.25*
Taper, Paperhangers, and Vinyl hangers	27.44	2.31*

*To be allocated at a later date.

ADDITIONAL AMOUNTS FOR SPECIFIC TYPES OF JOBSITE CONDITIONS (amount subject to any overtime premiums):
- Additional $ 1.00 per hour for Spray Work (does not apply to application of water-based coatings to walls)
- Additional $ 1.00 per hour for Swing Chair or Swing Scaffold
- Additional $ 2.00 per hour for Steeplejack
- Additional $ 1.00 per hour for Sand Blasting
- Additional $ 1.00 per hour for Acid or High Pressure Wash
- Additional $ 1.25 per hour for Structural Steel (buildings) defined as new or old construction where ceilings, walls or the steel itself is to be painted from open trusses which require climbing or crawling without the support of solid scaffolding or scaffolding starting at the floor or ground level.
- Additional $ 1.25 per hour for Epoxy-brush or roll (solvent base only)
- Additional $ 2.00 per hour for Drywall Machine Operator

NOTE - SEE BRIDGE PAINTER RATES FOR BRIDGES & TANKS

SUPPLEMENTAL BENEFITS
Per hour:
Journeyworker $ 24.03

OVERTIME PAY
See (B, E2, F, R) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
A Holiday that falls on a Sunday will be celebrated on Monday, a holiday that falls on a Saturday will be celebrated on Friday.

REGISTERED APPRENTICES
WAGES:

Painter: 750 hour terms at the Painter Apprentice wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th
$ 18.00	$ 18.50	$ 19.00	$ 19.50	$ 20.00	$ 21.00	$ 22.00	$ 23.00

Taper: 750 hour terms at the following Journeyworker Taper Apprentice wage rate:

1st	2nd	3rd	4th	5th	6th
$ 20.00	$ 20.50	$ 21.00	$ 21.50	$ 22.00	$ 23.00

ADDITIONAL AMOUNTS FOR SPECIFIC TYPES OF JOBSITE CONDITIONS (amount subject to any overtime premiums):
- Additional $ 1.00 per hour for Spray Work (does not apply to application of water-based coatings to walls)
- Additional $ 1.00 per hour for Swing Chair or Swing Scaffold
- Additional $ 2.00 per hour for Steeplejack
- Additional $ 1.00 per hour for Sand Blasting
- Additional $ 1.00 per hour for Acid or High Pressure Wash
- Additional $ 1.25 per hour for Structural Steel (buildings) defined as new or old construction where ceilings, walls or the steel itself is to be painted from open trusses which require climbing or crawling without the support of solid scaffolding or scaffolding starting at the floor or ground level.
- Additional $ 1.25 per hour for Epoxy-brush or roll (solvent base only)
- Additional $ 2.00 per hour for Drywall Machine Operator

SUPPLEMENTAL BENEFITS per hour:
Painter/Decorator:

1st	2nd	3rd	4th	5th	6th	7th	8th
$ 6.10	$ 7.10	$ 8.10	$ 9.20	$ 11.00	$ 11.00	$ 13.00	$ 13.64

Taper/Drywall Finisher:

1st	2nd	3rd	4th	5th	6th
$ 6.10	$ 7.10	$ 8.10	$ 10.00	$ 13.00	$ 13.73

2-178 E

Painter - Metal Polisher 07/01/2025

JOB DESCRIPTION Painter - Metal Polisher **DISTRICT** 8

ENTIRE COUNTIES
Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

	07/01/2025
Metal Polisher	$ 40.33
Metal Polisher*	41.43
Metal Polisher**	44.33

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS
Per Hour: 07/01/2025

Journeyworker:
All classification $ 13.44

OVERTIME PAY
See (B, E, P, T) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:
One (1) year term at the following wage rates:

	07/01/2025
1st year	$ 20.17
2nd year	22.18
3rd year	24.20
1st year*	$ 20.56
2nd year*	22.62
3rd year*	24.74
1st year**	$ 22.67
2nd year**	24.68
3rd year**	26.70

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:
Per hour:

1st year	$ 8.94
2nd year	8.94
3rd year	8.94

8-8A/28A-MP

Plumber 07/01/2025

JOB DESCRIPTION Plumber **DISTRICT** 6

ENTIRE COUNTIES
Chemung, Cortland, Onondaga, Schuyler, Tompkins

PARTIAL COUNTIES
Madison: Only the Townships of Sullivan, Cazenovia and DeRuyter.
Seneca: Only the Townships of Covert and Lodi.
Steuben: Only the Townships of Addison, Bath, Bradford, Campbell, Caton, Corning, Erwin, Hornby, Lindley, Pulteney, Rathbone, Thurston, Tuscarora, Urbana and Wayne.
Tioga: Only the Townships of Barton, Berkshire, Candor, Nichols, Richford, Spencer and Tioga.

WAGES

Per hour:	07/01/2025	05/01/2026 Additional
Plumber, Steamfitter, Pipefitter, Welder, HVAC, Refrigeration.	$ 48.26	$ 4.50*

* To be allocated at a later date.

SHIFT WORK
SINGLE IRREGULAR WORK SHIFT: Additional 15% premium added to the wage rate above for a single irregular work shift starting between 4:30PM and 7:00AM.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 28.15*

*NOTE: $10.27 of the supplemental benefits are paid at the same premium as shown for overtime work performed at semi-conductor manufacturer and/or fabrication plants.

OVERTIME PAY
Time and one half for the 9th & 10th hours Monday thru Friday and first 10 hours on Saturday. All other overtime hours are double time.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: If a holiday falls on Saturday, the holiday will be observed on the preceding Friday. If a holiday falls on Sunday, it will be observed on the following Monday.

REGISTERED APPRENTICES
WAGES per hour: One year terms at the following percentage of the Journeyworker's wage:

1st	2nd	3rd	4th	5th
55%	60%	70%	75%	85%

SUPPLEMENTAL BENEFITS per hour*:

1st	$ 15.87
2nd	24.67
3rd	25.30
4th	25.89
5th	26.90

*NOTE: Below is the portion of supplemental benefits paid at overtime premiums for work performed at semi-conductor manufacturer and/or fabrication plants:

1st	n/a
2nd	$ 8.58

3rd	8.77
4th	9.14
5th	9.71

6-81-SF

Roofer 07/01/2025

JOB DESCRIPTION Roofer **DISTRICT** 2

ENTIRE COUNTIES
Broome, Chemung, Chenango, Delaware, Otsego, Schoharie, Schuyler, Steuben, Tioga, Tompkins

WAGES

Per hour:	07/01/2025
Roofer, Waterproofer	$ 30.33
	+ 1.02*

*This amount is paid for all hours worked, whether regular or premium hours.

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount not subject to overtime premiums):
- On days where more than one shift is worked on the job, the hours worked after 4:30 PM and before 6:30 AM will be paid an additional $1.90 per hour premium. This premium is not for use in emergency repair situations.
- Premium of $1.25 per hour will be paid for the application, rip-off or handling of pitch products. The premium will be paid for pitch that is showing, covered or buried on the roof.
- Premium of $1.25 per hour will be paid for asbestos abatement requiring a half face respirator.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 23.99

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages:

Hours per term	
0-667 Hrs.	$ 21.24 + 0.71*
668-1335 Hrs.	22.76 + 0.76*
1336-2002 Hrs.	24.27 + 0.81*
2003-2669 Hrs.	25.79 + 0.86*
2670-3336 Hrs.	27.30 + 0.92*
3337-4000 Hrs.	28.82 + 0.97*

*This amount is paid for all hours worked, whether regular or premium hours.

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount not subject to overtime premiums):
- On days where more than one shift is worked on the job, the hours worked after 4:30 PM and before 6:30 AM will be paid an additional $1.90 per hour premium. This premium is not for use in emergency repair situations.
- Premium of $1.25 per hour will be paid for the application, rip-off or handling of pitch products. The premium will be paid for pitch that is showing, covered or buried on the roof.
- Premium of $1.25 per hour will be paid for asbestos abatement requiring a half face respirator.

Supplemental Benefits:

0-667 Hrs.	$ 19.93
668-1335 Hrs.	20.62
1336-2002 Hrs.	21.29
2003-2669 Hrs.	21.96
2670-3336 Hrs.	22.65
3337-4000 Hrs.	23.32

2-203elmi

Sheetmetal Worker 07/01/2025

JOB DESCRIPTION Sheetmetal Worker **DISTRICT** 2

ENTIRE COUNTIES
Allegany, Broome, Chemung, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

WAGES

Per hour:

	07/01/2025	05/01/2026 Additional	05/01/2027 Additional
Sheetmetal Worker	$ 39.74 + 0.99*	$ 4.00**	$ 4.00**

NOTE: Ten cents ($0.10) per hour additional premium to be paid when working polyresin fiberglass.
*Amount is paid for every hour worked (amount not subject to overtime premium)
**To be allocated at a later date

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker: $ 22.41

OVERTIME PAY
See (*B1, Q) on OVERTIME PAGE
*On Saturday, time and one half of the hourly rate for the first ten (10) hours, then two (2) times the hourly wage rate for all hours after ten (10) hours worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: Holidays are observed on the Holiday, not on the day that it is locally observed.

REGISTERED APPRENTICES
WAGES per hour:
Indentured after 05/01/2025 (1-year Terms):

1st	2nd	3rd	4th	5th
$ 23.84 +0.60*	$ 25.83 +0.65*	$ 27.82 +0.70*	$ 31.79 +0.79*	$ 33.78 +0.84*

Indentured prior to 05/01/2025 (Half Year Terms):

1st	2nd	3rd	4th	5th	6th	7th	8th
$ 23.84 +0.60*	$ 23.84 +0.60*	$ 25.83 +0.65*	$ 27.82 +0.70*	$ 29.81 +0.75*	$ 31.79 +0.79*	$ 33.78 +0.84*	$ 35.77 +0.89*

*Amount is paid for every hour worked (amount not subject to overtime premium)

SUPPLEMENTAL BENEFITS per hour:
Indentured after 05/01/2025:

1st	2nd	3rd	4th	5th
$ 2.12	$ 18.64	$ 18.72	$ 18.88	$ 22.17

Indentured prior to 05/01/2025:

1st	2nd	3rd	4th	5th	6th	7th	8th
$ 2.12	$ 2.12	$ 18.64	$ 18.72	$ 18.80	$ 18.88	$ 18.97	$ 19.05

2-112

Sprinkler Fitter — 07/01/2025

JOB DESCRIPTION Sprinkler Fitter **DISTRICT** 1

ENTIRE COUNTIES
Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Washington, Wayne, Wyoming, Yates

WAGES

Per hour	07/01/2025
Sprinkler Fitter	$ 45.06

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker $ 29.41

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

REGISTERED APPRENTICES
Wages per hour

One Half Year terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
$ 23.28	$ 25.98	$ 28.15	$ 30.31	$ 31.94	$ 34.64	$ 36.81	$ 38.97	$ 41.14	$ 43.30

Supplemental Benefits per hour

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
$ 9.57	$ 9.57	$ 21.49	$ 21.49	$ 21.74	$ 21.74	$ 21.74	$ 21.74	$ 21.74	$ 21.74

1-669

Teamster - Building / Heavy&Highway — 07/01/2025

JOB DESCRIPTION Teamster - Building / Heavy&Highway **DISTRICT** 7

ENTIRE COUNTIES
Chemung, Livingston, Monroe, Ontario, Schuyler, Wayne

PARTIAL COUNTIES
Genesee: Only in the townships of Oakfield, Elba, Batavia, Byron, Alexander, Bethany, Pavilion, Leroy, Stafford, and Bergen.
Orleans: Only in the townships of Gaines, Carlton, Barre, Kendall, Murray, Clarendon, and Albion.
Steuben: Only the Townships of: Addison, Avoca, Bath, Bradford, Cameron, Campbell, Caton, Corning, Erwin, Hornby, Howard, Lindley, Pulteney, Rathbone, Thurston, Tuscarora, Urbana, Wayland, Wayne, Wheeler, and Woodhull.
Tioga: Only from Nichols/Smithboro towards the City of Elmira (west).
Wyoming: Only in the townships of Attica, Orangeville, Wethersfield, Eagle, Genesee Falls, Castile, Ganesville, Perry, Warsaw, Middlebury, Covington, and Pike.

WAGES
*NOTE - THIS RATE APPLIES ONLY TO MILLING OPERATIONS (ASPHALT or CONCRETE) WHEN MATERIALS ARE TO BE REMOVED FROM THE PROJECT SITE.

Per hour:	07/01/2025	07/01/2026
Teamster - Mill Rate	$ 27.50	$ 28.50

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 12.96	$ 13.17

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

7-118-Mill

Teamster - Building / Heavy&Highway — 07/01/2025

JOB DESCRIPTION Teamster - Building / Heavy&Highway **DISTRICT** 7

ENTIRE COUNTIES
Chemung, Livingston, Monroe, Ontario, Schuyler, Wayne

PARTIAL COUNTIES
Genesee: Only in the townships of Oakfield, Elba, Batavia, Byron, Alexander, Bethany, Pavilion, Leroy, Stafford, and Bergen.
Orleans: Only in the townships of Gaines, Carlton, Barre, Kendall, Murray, Clarendon, and Albion.
Steuben: Only the Townships of: Addison, Avoca, Bath, Bradford, Cameron, Campbell, Caton, Corning, Erwin, Hornby, Howard, Lindley, Pulteney, Rathbone, Thurston, Tuscarora, Urbana, Wayland, Wayne, Wheeler, and Woodhull.
Tioga: Only from Nichols/Smithboro towards the City of Elmira (west).
Wyoming: Only in the townships of Attica, Orangeville, Wethersfield, Eagle, Genesee Falls, Castile, Ganesville, Perry, Warsaw, Middlebury, Covington, and Pike.

WAGES
GROUP #1: Warehousemen*, Yardmen*, Truck helpers, Pickups, Panel trucks, Flatboy material trucks (straight jobs), Single Axle dump trucks, Dumpsters, Material Checkers/Receivers*, Greasers, Tiremen, Mechanics Helpers/Parts Chasers.
GROUP #2: Tandems and Batch Trucks, Mechanics.
GROUP #3: Semi-trailers, Low-Boy trucks, Asphalt distributor trucks, and Agitator, Mixer trucks and Dumpcrete type vehicles, Truck mechanic, Fuel trucks.

GROUP #4: Articulated off-road material hauler, Specialized earth moving equipment, Euclid type, or similar off-highway equipment, where not self-loaded, Straddle (Ross) carrier, and self-contained concrete mobile truck.
GROUP #5: Off-highway Tandem back-dump, Twin engine equipment and double-hitched equipment where not self-loaded.

*NOTE - Applies when a temporary warehouse structure is built/utilized specifically for a public work project.

Per hour:	07/01/2025	07/01/2026
GROUP #1	$ 31.39	$ 33.59
GROUP #2	31.44	33.64
GROUP #3	31.49	33.69
GROUP #4	31.64	33.84
GROUP #5	31.79	33.99

Additional $1.50 per hour for hazardous waste removal work on a City, County, State and/or Federal Designated waste site and regulations require employee to use or wear personal protection.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 27.77	$ 27.94

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

7-118

Welder 07/01/2025

JOB DESCRIPTION Welder **DISTRICT** 1

ENTIRE COUNTIES
Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES
Per hour 07/01/2025

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

(AA)	Time and one half of the hourly rate after 7 and one half hours per day
(A)	Time and one half of the hourly rate after 7 hours per day
(B)	Time and one half of the hourly rate after 8 hours per day
(B1)	Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday. Double the hourly rate for all additional hours
(B2)	Time and one half of the hourly rate after 40 hours per week
(B3)	Time and one half of the hourly rate after 40 straight hours per week
(C)	Double the hourly rate after 7 hours per day
(C1)	Double the hourly rate after 7 and one half hours per day
(D)	Double the hourly rate after 8 hours per day
(D1)	Double the hourly rate after 9 hours per day
(E)	Time and one half of the hourly rate on Saturday
(E1)	Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
(E2)	Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E3)	Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
(E4)	Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E5)	Double time after 8 hours on Saturdays
(F)	Time and one half of the hourly rate on Saturday and Sunday
(G)	Time and one half of the hourly rate on Saturday and Holidays
(H)	Time and one half of the hourly rate on Saturday, Sunday, and Holidays
(I)	Time and one half of the hourly rate on Sunday
(J)	Time and one half of the hourly rate on Sunday and Holidays
(K)	Time and one half of the hourly rate on Holidays
(L)	Double the hourly rate on Saturday
(M)	Double the hourly rate on Saturday and Sunday
(N)	Double the hourly rate on Saturday and Holidays
(O)	Double the hourly rate on Saturday, Sunday, and Holidays
(P)	Double the hourly rate on Sunday
(Q)	Double the hourly rate on Sunday and Holidays
(R)	Double the hourly rate on Holidays

(S) Two and one half times the hourly rate for Holidays

(S1) Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.

(T) Triple the hourly rate for Holidays

(U) Four times the hourly rate for Holidays

(V) Including benefits at SAME PREMIUM as shown for overtime

(W) Time and one half for benefits on all overtime hours.

(X) Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

(1)	None
(2)	Labor Day
(3)	Memorial Day and Labor Day
(4)	Memorial Day and July 4th
(5)	Memorial Day, July 4th, and Labor Day
(6)	New Year's, Thanksgiving, and Christmas
(7)	Lincoln's Birthday, Washington's Birthday, and Veterans Day
(8)	Good Friday
(9)	Lincoln's Birthday
(10)	Washington's Birthday
(11)	Columbus Day
(12)	Election Day
(13)	Presidential Election Day
(14)	1/2 Day on Presidential Election Day
(15)	Veterans Day
(16)	Day after Thanksgiving
(17)	July 4th
(18)	1/2 Day before Christmas
(19)	1/2 Day before New Years
(20)	Thanksgiving
(21)	New Year's Day
(22)	Christmas
(23)	Day before Christmas
(24)	Day before New Year's
(25)	Presidents' Day
(26)	Martin Luther King, Jr. Day
(27)	Memorial Day
(28)	Easter Sunday

(29) Juneteenth

NEW YORK STATE DEPARTMENT OF LABOR
Bureau of Public Work - Debarment List

LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE AWARDED ANY PUBLIC WORK CONTRACT

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has WILLFULLY failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

Debarment Database: To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, or under NYS Workers' Compensation Law Section 141-b, access the database at this link: https://apps.labor.ny.gov/EDList/searchPage.do

For inquiries please call 518-457-5589.

NYSDOL Bureau of Public Work Debarment List 07/03/2025

Article 8

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	DOL	*****5754	0369 CONTRACTORS, LLC		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL	*****5784	A.J.M. TRUCKING, INC.		PO BOX 2064 MONROE NY 10950	02/12/2024	02/12/2029
DOL	DOL		AKHLAQ OULAKH		4307 28TH AVE ASTORIA NY 11103	10/11/2024	10/11/2029
DOL	NYC		ALL COUNTY SEWER & DRAIN, INC.		7 GREENFIELD DR WARWICK NY 10990	03/25/2022	03/25/2027
DOL	DOL	*****8387	AMERICAN PAVING & MASONRY, CORP.		8 FOREST AVE GLEN COVE NY 11542	05/24/2024	05/24/2029
DOL	DOL	*****8654	AMERICAN PAVING, INC.		8 FORREST AVE. GLEN COVE NY 11542	05/24/2024	05/24/2029
DOL	NYC		AMJED PARVEZ		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		ANGELO GARCIA		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL		ANGELO STANCO		8 FOREST AVE. GLEN COVE NY 11542	05/24/2024	05/24/2029
DOL	DOL		ANGELO TONDO		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL	*****4231	ANKER'S ELECTRIC SERVICE, INC.		10 SOUTH 5TH ST LOCUST VALLEY NY 11560	09/26/2022	09/26/2027
DOL	DOL		ANTHONY MONGELLI		PO BOX 2064 MONROE NY 10950	02/12/2024	02/12/2029
DOL	NYC		ARADCO CONSTRUCTION CORP		115-46 132RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	NYC		AVM CONSTRUCTION CORP		117-72 123RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	NYC		AZIDABEGUM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****8421	B & B DRYWALL, INC		206 WARREN AVE APT 1WHITE PLAINS NY 10603	12/14/2021	12/14/2026
DOL	DOL		B&L RENOVATION CO.		618 OCEAN PARKWAY APT A6BROOKLYN NY 11230	09/17/2020	09/17/2025
DOL	NYC	*****2113	BHW CONTRACTING, INC.		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DA	*****9290	BJA RENOVATION, CORP		33 DOLLARD DR NORTH BABYLON NY 11703	03/19/2025	03/19/2030
DOL	DOL	*****5078	BLACK RIVER TREE REMOVAL, LLC		29807 ANDREWS ROAD BLACK RIVER NY 13032	10/17/2023	10/17/2028
DOL	DOL		BRADLEY J SCHUKA		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL	*****5161	CALADRI DEVELOPMENT CORP.		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	DOL	*****3391	CALI ENTERPRISES, INC.		1223 PARK STREET PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	DOL	*****4155	CASA BUILDERS, INC.	FRIEDLANDER CONSTRUCTION	64 N PUTT CONNERS ROAD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	AG	*****7247	CENTURY CONCRETE CORP		2375 RAYNOR ST RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****0026	CHANTICLEER CONSTRUCTION LLC		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	NYC	*****2117	CHARAN ELECTRICAL ENTERPRISES		9-11 40TH AVENUE LONG ISLAND CITY NY 11101	09/26/2023	09/26/2028
DOL	DOL		CHRISTOPHER GRECO		26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL	*****2281	CORRAO TRUCKING, INC.		PO BOX 393 NANUET NY 10954	09/17/2024	09/17/2029
DOL	DOL		CRAIG JOHANSEN		10 SOUTH 5TH ST LOCUST VALLEY NY 11560	09/26/2022	09/26/2027
DOL	DOL	*****3228	CROSS-COUNTY LANDSCAPING AND TREE SERVICE, INC.	ROCKLAND TREE SERVICE	26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026

NYSDOL Bureau of Public Work Debarment List 07/03/2025

Article 8

DOL	DOL		DANIEL ROBERT MCNALLY		7 GREENFIELD DRIVE WARWICK NY 10990	03/25/2022	03/25/2027
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		DARWIN PEGUESE		6400 BALTIMORE NATIONAL SUITE 602CANTONSVILLE NY 21228	10/24/2024	10/24/2029
DOL	DOL		DAVID FRIEDLANDER		64 NORTH PUTT CORNERS RD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	DOL		DINA TAYLOR		64 N PUTT CONNERS RD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	AG		EDWIN HUTZLER		23 NORTH HOWELLS RD BELLPORT NY 11713	08/04/2021	08/04/2026
DOL	DA		EDWIN HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	DOL		EMIL KISZKO		84 DIAMOND ST BROOKLYN NY 11222	07/18/2024	07/18/2029
DOL	DOL	*****3298	EMJACK CONSTRUCTION CORP.		84 DIAMOND ST BROOKLYN NY 11222	07/18/2024	07/18/2029
DOL	DOL	*****3298	EMJACK CONSTRUCTION LLC		4192 SIR ANDREW CIRCLE DOYLESTOWN PA 18902	07/18/2024	07/18/2029
DOL	DOL		EUGENIUSZ "GINO" KUCHAR		195 KINGSLAND AVE BROOKLYN NY 11222	12/22/2023	12/22/2028
DOL	DA		FREDERICK HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****2998	G.E.M. AMERICAN CONSTRUCTION CORP.		195 KINGSLAND AVE BROOKLYN NY 11222	12/22/2023	12/22/2028
DOL	NYC		GAYATRI MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DA		GIOVANNA TRAVALJA		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	DA		GIOVANNI NAPOLITANO		2501 BAYVIEW AVENUE WANTAGH NY 11793	02/21/2024	02/21/2029
DOL	DA	*****0213	GORILLA CONTRACTING GROUP, LLC		505 MANHATTAN AVE WEST BABYLON NY 11704	10/05/2023	10/05/2028
DOL	DA	*****4760	GTX CONSTRUCTION ASSOCIATES, CORP		2501 BAYVIEW AVE WANTAGH NY 11793	02/21/2024	02/21/2029
DOL	DOL		HERBERT CLEMEN		42 FOWLER AVENUE CORTLAND MANOR NY 10567	01/24/2023	01/24/2028
DOL	DOL		HERBERT CLEMEN		42 FOWLER AVENUE CORTLAND MANOR NY 10567	10/25/2022	10/25/2027
DOL	DOL	*****2397	ISLAND BREEZE MARINE, INC.		6400 BALTIMORE NATIONAL CANTONSVILLE MD 21228	10/24/2024	10/24/2029
DOL	DOL	*****9211	J. WASE CONSTRUCTION CORP.		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		J.M.J CONSTRUCTION		151 OSTRANDER AVENUE SYRACUSE NY 13205	11/21/2022	11/21/2027
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	12/12/2022	12/12/2027
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	12/22/2022	12/22/2027

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DOL	DOL		JAMES J. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****7993	JBS DIRT, INC.		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	*****2435	JEFFEL D. JOHNSON	JMJ7 AND SON	5553 CAIRNSTRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JEFFEL JOHNSON ELITE CARPENTER REMODEL AND CONSTRUCTION		C2 EVERGREEN CIRCLE LIVERPOOL NY 13090	11/21/2022	11/21/2027
DOL	DOL	*****2435	JEFFREY M. JOHNSON	JMJ7 AND SON	5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JIM PLAUGHER		17613 SANTE FE LINE ROAD WAYNEFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL		JMJ7 & SON CONSTRUCTION, LLC		5553 CAIRNS TRAIL LIVERPOOL NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 AND SONS CONTRACTORS		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS		7014 13TH AVENUE BROOKLYN NY 11228	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS AND SONS		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS, LLC		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JOHN MARKOVIC		47 MANDON TERRACE HAWTHORN NJ 07506	03/29/2021	03/29/2026
DOL	DOL		JOHN WASE		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		JORGE RAMOS		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	DA		JOSEPH DEMASCO		33 DOLLARD DRIVE NORTH BABYLON NY 11703	03/19/2025	03/19/2030
DOL	DOL		JOSEPH HALL		937 US ROUTE 11 CENTRAL SQUARE NY 13036	10/21/2024	10/21/2029
DOL	DOL	*****2271	JOSEPH HALL COMPANIES LLC		937 US ROUTE 11 CENTRAL SQUARE NY 13036	10/21/2024	10/21/2029
DOL	DOL		JOSEPH K. SALERNO		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL		JOSEPH K. SALERNO II		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		JRN CONSTRUCTION CO, LLC		1024 BROADWAY ALBANY NY 12204	11/07/2023	11/07/2028
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002

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DOL	DOL		KATE E. CONNOR		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KEAN INDUSTRIES, LLC		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	DOL	*****2959	KELC DEVELOPMENT, INC		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KEVIN FUNEZ URBINA A/K/A KEVIN FUNEZ		1009 LYNDALE AVE TRENTON NJ 08629	12/16/2024	12/16/2029
DOL	DOL		KIMBERLY F. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	*****8760	KJ&J CONSTRUCTION, LLC		1009 LYNDALE AVE TRENTON NJ 08629	12/16/2024	12/16/2029
DOL	DOL		KMA GROUP II, INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL	*****1833	KMA GROUP INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL		KMA INSULATION, INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL		KRIN HEINEMANN		2345 ROUTE 52, SUITE 2N HOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	NYC		KULWANT S. DEOL		9-11 40TH AVENUE LONG ISLAND CITY NY 11101	09/26/2023	09/26/2028
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL	*****3716	LIGHTNIN ELECTRIC INC.		3418 NORTHERN BLVD SUITE 5-27LONG ISLAND CITY NY 11101	12/13/2024	12/13/2029
DOL	AG	*****3291	LINTECH ELECTRIC, INC.		3006 TILDEN AVE BROOKLYN NY 11226	02/16/2022	02/16/2027
DOL	DOL		LOUIS A. CALICCHIA		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	DOL	*****2196	MAINSTREAM SPECIALTIES, INC.		11 OLD TOWN RD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DA		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	DA		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		MAQSOOD AHMAD		618 OCEAN PKWY BROOKLYN NY 11230	09/17/2020	09/17/2025
DOL	DOL	*****1320	MJC MASON CONTRACTING, INC.		42 FOWLER AVENUE CORTLAND MANOR NY 10567	10/25/2022	10/25/2027
DOL	DOL	*****1320	MJC MASON CONTRACTING, INC.		42 FOWLER AVENUE CORTLAND MANOR NY 10567	01/24/2023	01/24/2028
DOL	DOL		MOHAMMAD MIAN		8269 21ST ST BELLEROSE NY 11426	12/22/2022	12/22/2027
DOL	NYC		MUHAMMED A. HASHEM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		NASEER CHAUDHRY		2349 BRAGG STREET BROOKLYN NY 11229	04/22/2025	04/22/2030
DOL	DOL	*****7790	NATIONAL BUILDING & RESTORATION CORP		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL	*****1797	NATIONAL CONSTRUCTION SERVICES, INC		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	NYC		NAVIT SINGH		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		NELCO CONTRACTING, LLC		1024 BROADWAY ALBANY NY 12204	11/07/2023	11/07/2028
DOL	DA		NICHOLAS BARNETT		33 DOLLARD DR BABYLON NY 11703	03/04/2025	03/04/2030
DOL	DA		NICHOLAS T. ANALITIS		505 MANHATTAN AVE WEST BABYLON NY 11704	10/05/2023	10/05/2028
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027

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DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	*****7429	NICOLAE I. BARBIR	BESTUCCO CONSTRUCTI ON, INC.	444 SCHANTZ ROAD ALLENTOWN PA 18104	09/17/2020	09/17/2025
DOL	DOL		NIKOLA NTONI		3418 NORTHERN BLVD SUITE 5-27LONG ISLAND CITY NY 11101	12/13/2024	12/13/2029
DOL	NYC	*****6971	NN CONSTRUCTION, INC.		2349 BRAGG STREET BROOKLYN NY 11229	04/22/2025	04/22/2030
DOL	NYC	*****5643	NYC LINE CONTRACTORS, INC.		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		PATRICK PENNACCHIO		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	DOL		PATRICK PENNACCHIO		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	DOL		PAULINE CHAHALES		935 S LAKE BLVD MAHOPAC NY 10541	03/02/2021	03/02/2026
DOL	DOL		PETER STEVENS		11 OLD TOWN ROAD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DOL	*****4168	PHANTOM CONSTRUCTION CORP.		95-27 116TH STREET QUEENS NY 11419	07/12/2024	07/12/2029
DOL	DOL	*****4168	PHANTOM CONSTRUCTION CORP.		95-27 116TH STREET QUEENS NY 11419	05/28/2024	05/28/2029
DOL	DOL	*****4772	R.W. LOBDELL CONSTRUCTION LLC		635 WEST DRYDEN ROAD FREEVILLE NY 13068	01/31/2025	01/31/2030
DOL	NYC		RASHEL CONSTRUCTION CORP		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****2633	RAW POWER ELECTRIC CORP.		3 PARK CIRCLE MIDDLETOWN NY 10940	07/11/2022	07/11/2027
DOL	DA	*****7559	REGAL CONTRACTING INC.		24 WOODBINE AVE NORTHPORT NY 11768	10/01/2020	10/01/2025
DOL	DOL		ROBBYE BISSESAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	07/11/2022	07/11/2027
DOL	DOL	*****7172	RZ & AL INC.		198 RIDGE AVENUE VALLEY STREAM NY 11581	06/06/2022	06/06/2027
DOL	DOL		SAL FRESINA MASONRY CONTRACTORS, INC.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		SAL MASONRY CONTRACTORS, INC.		(SEE COMMENTS) SYRACUSE NY 13202	07/16/2021	07/16/2026
DOL	DOL	*****9874	SALFREE ENTERPRISES INC		P.O BOX 14 2821 GARDNER RDPOMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		SALVATORE A FRESINA A/K/A SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	DOL		SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	DA	*****0476	SAMCO ELECTRIC CORP.		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	DA		SILVANO TRAVALJA		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	DOL	*****0440	SOLAR GUYS INC.		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	NYC		SOMATIE RAMSUNAHAI		115-46 132ND ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	NYC	*****3661	SPANIER BUILDING MAINTENANCE CORP		200 OAK DRIVE SYOSSET NY 11791	03/14/2022	03/14/2027
DOL	DOL		STANADOS KALOGELAS		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL	*****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL	*****9528	STEEL-IT, LLC.		17613 SANTE FE LINE ROAD WAYNESFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL	*****3800	SUBURBAN RESTORATION CO. INC.		5-10 BANTA PLACE FAIR LAWN PLACE NJ 07410	03/29/2021	03/29/2026
DOL	DOL	*****9150	SURGE INC.		8269 21ST STREET	12/22/2022	12/22/2027

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DOL	DOL		SYED MUHAMMAD S. JAFRI A/K/A SHARRUKH JAFRI		4307 28TH AVE ASTORIA NY 11103	10/11/2024	10/11/2029
DOL	DOL		SYED RAZA		198 RIDGE AVENUE NY 11581	06/06/2022	06/06/2027
DOL	DOL		TARLOK SINGH		95-27 116TH STREET QUEENS NY 11419	05/28/2024	05/28/2029
DOL	DOL		TARLOK SINGH		95-27 116TH STREET QUEENS NY 11419	07/12/2024	07/12/2029
DOL	DOL	*****9733	TERSAL CONSTRUCTION SERVICES INC		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13208	07/16/2021	07/16/2026
DOL	DOL		TERSAL CONTRACTORS, INC.		221 GARDNER RD P.O BOX 14POMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		TERSAL DEVELOPMENT CORP.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL	*****2426	THE MATRUKH GROUP, INC.		4307 28TH AVE PO BOX 9082ASTORIA NY 11103	10/11/2024	10/11/2029
DOL	DOL		THOMAS LOBDELL		635 WEST DRYDEN ROAD FREEVILLE NY 13068	01/31/2025	01/31/2030
DOL	DOL		TIMOTHY PERCY		29807 ANDREWS ROAD BLACK RIVER NY 13612	10/17/2023	10/17/2028
DOL	DA	*****1050	TRI STATE CONSTRUCTION OF NY CORP.		50-39 175TH PLACE FRESH MEADOWS NY 11365	03/28/2022	03/28/2027
DOL	DA	*****4106	TRIPLE H CONCRETE CORP		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****8210	UPSTATE CONCRETE & MASONRY CONTRACTING CO INC		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL	*****6418	VALHALLA CONSTRUCTION, LLC.		796 PHLEPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	NYC	*****2426	VICKRAM MANGRU	VICK CONSTRUCTI ON	21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	NYC		VICKRAM MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		VINCENT CORRAO		PO BOX 393 NANUET NY 10954	09/17/2024	09/17/2029
DOL	DOL	*****8266	WILLIAM CHRIS MCCLENDON	MCCLENDON ASPHALT PAVING	1646 FALLS STREET NIAGARA FALLS NY 14303	05/01/2023	05/01/2028
DOL	DOL		WILLIAM CHRIS MCCLENDON		1646 FALLS STREET NIAGARA FALLS NY 14303	05/01/2023	05/01/2028
DOL	DOL		WILLIAM G. PROERFRIEDT		85 SPRUCEWOOD ROAD WEST BABYLON NY 11704	01/19/2021	01/19/2026
DOL	DOL	*****5924	WILLIAM G. PROPHY, LLC	WGP CONTRACTIN G, INC.	54 PENTAQUIT AVE BAYSHORE NY 11706	01/19/2021	01/19/2026
DOL	DOL		WILLIAM SCRIVENS		4192 SIR ANDREW CIRCLE DOYELSTOWN PA 18902	07/18/2024	07/18/2029
DOL	DOL		XENOFON EFTHIMIADIS		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 10 00

SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project location.

B. Contracts.

C. Administrative and procedural sections applicable to all contracts.

D. Temporary facilities and controls applicable to all contracts.

E. Contract closeout applicable to all contracts.

F. Work sequence.

1.2 PROJECT LOCATION

A. The project consists of work at the following facilities and/or site:

Odessa Elementary and High School
300 College Avenue
Odessa, NY 14869

Odessa-Montour Bus Garage
409 NY-224
Odessa, NY 14869

1.3 CONTRACTS

A. Perform Work of each Prime Contract under a separate stipulated sum contract with the Owner.

B. Work of each separate Contract is identified in the following Articles.

1.4 ADMINISTRATIVE AND PROCEDURAL SECTIONS APPLICABLE TO ALL CONTRACTS

A. Section 01 21 00 – Price and Payment Procedures: Cash allowances, contingency allowances, schedule of values, applications for payment, and change procedures.

B. Section 01 30 00 – Administrative Requirements: Coordination and project conditions, field engineering, pre-construction conference, site mobilization conference, progress meetings, pre-installation conferences, on-site manager, job superintendent, construction mobilization, equipment electrical characteristics and components, cutting and patching, and special procedures.

C. Section 01 33 00 – Submittals: Submittal procedures, construction progress schedules, proposed products list, product data, shop drawings, samples, certificates, and manufacturer's instructions.

D. Section 01 40 00 – Quality Requirements: Contract quality control and control of installation, tolerances, references, field samples, mock-up requirements, manufacturer's field services and reports, and testing and inspection.

E. Section 01 41 00 – Regulatory Requirements: Building codes, and labor laws.

F. Section 01 60 00 – Product Requirements: Products, product delivery requirements, product storage and handling requirements, product options, and product substitution procedures.

1.5 TEMPORARY FACILITIES AND CONTROLS SECTIONS APPLICABLE TO ALL CONTRACTS

A. Section 01 50 00 - Construction Facilities and Controls: Temporary utilities, telephone service, facsimile service, temporary water service, temporary sanitary facilities, water control, exterior enclosures, interior enclosures, protection of installed work, maintenance of traffic, parking, progress cleaning, project identification, field offices and sheds, scaffolds, staging and safety devices, lifting devices and hoisting facilities, and removal of utilities, facilities, and controls.

B. Section 01 50 13 – Safety Standards: Owner occupancy, fencing, barriers, security, fire and hazard protection, progress cleaning, ventilation during construction, materials containing asbestos, and materials containing lead-based paint.

C. Section 01 50 23 – Uniform Safety Standards for School Construction: Building occupancy, general safety and security standards, separation of construction, exiting plan, ventilation plan, construction noise, construction contaminants, asbestos abatement, and presence of lead.

D. Section 01 51 00 – Temporary Utilities: Temporary electricity, temporary lighting for construction purposes, temporary heating and ventilation, and costs.

1.6 CONTRACT CLOSEOUT APPLICABLE TO ALL CONTRACTS

A. Section 01 70 00 – Execution Procedures: Closeout procedures, final cleaning, starting of systems, demonstration and instruction, testing, adjusting and balancing, protecting installed construction, project record documents, operation and maintenance data, manual for materials and finishes, manual for equipment and systems, spare parts and maintenance products, product warranties and product bonds, final inspection, evidence of payment and release of liens, final application for payment, final certification for payment, and asbestos certification.

1.7 CONTRACT NO. 1 - GENERAL CONSTRUCTION

A. Contract includes but is not limited to:

1. All sitework including walks, drives, utilities, etc.

2. Demolition work, including walls, doors, ceilings, floor finish, floors, wall finishes, and casework.

3. Exterior masonry restoration.

4. Interior doors, frames, sidelites, borrowed lites, door hardware, and glazing.

5. Aluminum storefronts, doors, and glazing. FRP doors and associated frames, caulking, and accessories as required to perform work.

6. Resilient flooring and base, carpet, reducer strips and accessories

7. Glazed walll and floor tile, base, and accessories.

8. Interior gypsum board and associated framing, suspended acoustical ceilings, painting, and accessories as required to complete work.

9. Markerboards, tack-boards, toilet compartments and accessories. Interior wall mounted signage, exterior dimensional letter signage, lockers, and accessories as required to complete work.

10. The above includes all work at the Odessa Elementary, High School and Bus garage.

B. Division 01 - General Requirements.

1. Administrative and procedural section listed above.

2. Temporary facilities and controls section listed above.

3. Contract closeout section listed above.

C. Division 02 – Existing Conditions: All sections.

D. Division 03 - Concrete: All sections.

E. Division 04 - Masonry: All sections.

F. Division 05 - Metals:

1. Section 05 50 00 – Metal Fabrications.

2. Section 05 52 13 – Pipe and Tube Railings.

G. Division 06 – Wood, Plastic, and Composites: All sections.

H. Division 07 - Thermal and Moisture Protection:

1. Section 07 62 00 – Sheet Metal Flashing and Trim.

2. Section 07 84 00 – Firestopping.

3. Section 07 92 00 – Joint Sealants.

I. Division 08 - Openings: All sections.

J. Division 09 - Finishes: All sections.

K. Division 10 - Specialties: All sections.

L. Division 11 - Equipment:
1. 11 30 13 – Residential Appliances

M. Division 12 - Furnishings: All sections.

N. Division 14 - Conveying Systems: All sections.

1.8 CONTRACT NO. 2 - MECHANICAL

A. Contract includes but is not limited to:

1. Odessa Elementary and High School and the Bus Garage
   a. Elementary, High School, and Bus Garage heating and ventilation system alterations to accommodate reconfigured areas including replacing existing roof exhaust fans and ceiling-mounted cabinet heaters with new rooftop packaged energy recovery ventilators with electric heat, with associated ductwork, controls and equipment as indicated on mechanical drawings.

B. Division 01 - General Requirements:

1. Administrative and procedural section listed above.

2. Temporary facilities and controls section listed above.

3. Contract closeout section listed above.

C. Division 02 – Existing Conditions:

1. Section 02 42 00 – Demolition.

D. Division 07 – Thermal and Moisture Protection:

1. Section 07 84 00 – Fire Stopping.

2. Section 07 92 00 – Joint Sealants.

E. Division 09 – Finishes:

1. Section 09 90 00 – Painting and Coating.

F. Division 23 – Heating, Ventilating, and Air Conditioning:

1. Section 23 01 00 – Basic Mechanical Requirements.

2. Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment.

3. Section 23 05 53 – Identification for HVAC Piping and Equipment.

4. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC.

5. Section 23 07 13 – Duct Insulation.

6. Section 23 07 19 – HVAC Piping Insulation.

7. Section 23 08 00 – Commissioning of HVAC.

8. Section 23 09 23 – Direct-Digital Control System for HVAC.

9. Section 23 21 13 – Hydronic Piping.

10. Section 23 21 23 – Hydronic Pumps.

11. Section 23 73 00 – Indoor Central-Station Air-Handling Units.

12. Section 23 23 00 – Refrigerant Piping.

13. Section 23 31 00 – HVAC Ducts and Casing.

14. Section 23 34 23 – HVAC Power Ventilators.

15. Section 23 52 16 – Condensing Boilers.

16. Section 23 72 00 – Air-to-Air Energy Recovery Equipment.

17. Section 23 81 26 – Split-System Air-Conditioners.

18. Section 23 82 00 – Convection Heating and Cooling Units

1.9 CONTRACT NO. 3 - ELECTRICAL

A. Contract includes but is not limited to the following at the Odessa Elementary and High School and the Bus Garage.:

1. Replacement of lighting and associated controls withing the renovated areas of the buildings

2. Replacement of convenience power and data communications system outlets within the renovated areas of the buildings.

3. Provide Electrical connections to HVAC and Plumbing equipment.

B. Division 01 - General Requirements:

1. Administrative and procedural section listed above.

2. Temporary facilities and controls section listed above.

3. Contract closeout section listed above.

C. Division 02 – Existing Conditions:

1. Section 02 41 00 – Demolition.

D. Divion 07 – Thermal and Moisture Protection:

1. Section 07 84 00 – Fire Stopping.

2. Section 07 92 00 – Joint Sealants.

E. Division 09 – Finishes:

1. Section 09 90 00 – Painting and Coating.

F. Division 26 - Electrical: All Division 26 Sections.

G. Division 28 – Electronic Safety and Security: All Division 28 Sections.

1.10 CONTRACT NO. 4 - PLUMBING

A. Contract includes but is not limited to the following at the Odessa Elementary and High School and the Bus Garage:

1. Replacing all plumbing fixtures and associated domestic water, sanitary and vent piping in areas of renovation.

B. Division 01 - General Requirements:

1. Administrative and procedural section listed above.

2. Temporary facilities and controls section listed above.

3. Contract closeout section listed above.

C. Division 02 – Existing Conditions:

1. Section 02 41 19 – Selective Demolition.

D. Division 03 – Concrete:

1. Section 03 01 00 – Maintenance of Concrete.

E. Division 05 – Metals:

1. Section 05 12 00 – Structural Steel Framing.

F. Division 07 – Thermal and Moisture Protection:

1. Section 07 84 00 – Fire Stopping.

2. Section 07 92 00 – Joint Sealants.

G. Division 22 - Plumbing: All Division 22 Sections.

1.11 CONTRACT NO. 5 – FOOD SERVICE

A. Contract includes but is not limited to:

1. Replacement of food service equipment in the kitchen.

B. Division 01 - General Requirements:

1. Administrative and procedural section listed above.

2. Temporary facilities and controls section listed above.

3. Contract closeout section listed above.

C. Division 02 – Existing Conditions: All sections.

D. Division 11 – Equipment:

1. Section 11 40 00 – Foodservice Equipment

1.12 WORK SEQUENCE

A. Construct Work in phases to accommodate Owner's occupancy requirements during the construction period, coordinate construction schedule and operations with Owner, Architect/Engineer and Construction Manager:

1. All contractors are responsible for jointly developing a schedule to meet or better the above dates.

2. The intent shall be to start work immediately after contract award, with subsequent work to follow in an expedient manner.

3. All Prime Contractors are responsible for all work under their contract no matter what Drawings on which that work appears.

4. All Prime contractors shall be equally responsible to coordinate with each other so that the Work and schedule is not impeded and to insure completion.

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

6. All OSHA safety and hazardous materials regulations will be abided by on this project. All Contractors must submit a safety program, a hazardous materials program, (all required data must be maintained at the job site) and attend safety meetings, as required by governmental agencies.

7. All construction shall be completed to support Owner’s occupancy of areas in accordance with the sequence of Work.

8. All contractors shall be responsible to maintain manpower and shifts necessary to insure completion on schedule. Multiple Crews: To maintain the project schedule, each Prime Contractor shall provide multiple crews as may be required. Each crew is to be furnished with its own supervision, cranes, scaffold and other means necessary to maintain the Project Schedule.

9. The Work shall be conducted to provide the least possible interference to the activities of the Owner's personnel. Coordination of any utility and/or power interruption must be done with the Architect/Engineer. Shutdowns must occur during off hours and non-occupied days only.

10. Start dates on segments of the Work may be modified at the Owner's and Architect/Engineer's discretion.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 21 00

PRICE AND PAYMENT PROCEDURES

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cash allowances.

B. Schedule of allowances.

C. Schedule of values.

D. Hourly rate breakdown.

E. Application for payment.

F. Change procedures.

1.2 ALLOWANCES

A. Costs Included in Allowances: Cost of product to Contractor or Subcontractor, less applicable trade discounts, and delivery to site. Product handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage, and labor for installation and finishing unless specified otherwise.

B. Costs Not Included in the Allowance: Costs for overhead and profit for items purchased and installed under Allowances. It is the responsibility of the Contractor to include overhead and profit as part of the Base Bid.

C. Architect/Engineer Responsibilities:

1. Consult with Contractor for consideration and selection of products, suppliers, and/or installers.

2. Select products in consultation with Owner and transmit decision to Construction Manager.

D. Contractor Responsibilities:

1. Assist Architect/Engineer in selection of products, suppliers, and installers. Selection shall be coordinated through the Construction Manager.

2. Obtain proposals from suppliers and installers and offer recommendations.

3. On notification of selection by Construction Manager, execute purchase agreement with designated suppliers and installers.

4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.

5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Funds will be drawn from Allowances only by letter with a Change Order processed at Project Completion. Assignment of additional work directed in the field to the Field Allowance is at the discretion of the Owner.

F. Whenever costs are more or less than Allowance, the contract sum shall be adjusted by Change Order.

1.3 SCHEDULE OF ALLOWANCES

A. CONTRACT NO. 1 – GENERAL CONSTRUCTION

1. Field Directive Allowance: The General Contractor shall include in their Base Bid the amount of Seventy Five Thousand Dollars ($75,000) for the purpose of covering the costs of field directive work for unforeseen conditions as directed by the Owner and Construction Manager.

B. CONTRACT NO. 2 – MECHANICAL CONSTRUCTION

1. Field Directive Allowance: The Mechanical Contractor shall include in their Base Bid the amount of Thirty Five Thousand Dollars ($35,000) for the purpose of covering the costs of field directive work for unforeseen conditions as directed by the Owner and Construction Manager.

C. CONTRACT NO. 3 – ELECTRICAL CONSTRUCTION

1. Field Directive Allowance: The Electrical Contractor shall include in their Base Bid the amount of Twenty Thousand Dollars ($20,000) for the purpose of covering the costs of field directive work for unforeseen conditions as directed by the Owner and Construction Manager.

D. CONTRACT NO. 4 – PLUMBING CONSTRUCTION

1. Field Directive Allowance: The Mechanical Contractor shall include in their Base Bid the amount of Twenty Thousand Dollars ($20,000) for the purpose of covering the costs of field directive work for unforeseen conditions as directed by the Owner and Construction Manager.

E. CONTRACT NO. 5 – FOOD SERVICE CONSTRUCTION

1. Field Directive Allowance: The Food Service Contractor shall include in their Base Bid the amount of Five Thousand Dollars ($5,000) for the purpose of covering the costs of field directive work for unforeseen conditions as directed by the Owner and Construction Manager.

1.4 SCHEDULE OF VALUES

A. Submit typed schedule on AIA Form G703 - Continuation Sheet for G732. Contractor's standard form or electronic media printout will be considered.

B. Submit Schedule of Values to Construction Manager in duplicate within ten (10) days after date established in Notice to Proceed.

C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification Section. Identify site mobilization and bonds and insurance.

D. Allowances shall show as individual line items. It will not be necessary to indicate breakdown of allowances by material and labor.

E. Include within each line item, a directly proportional amount of Contractor's overhead and profit, except cash allowances. Refer to paragraph 1.3, Item B above.

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

1.5 HOURLY LABOR RATE BREAKDOWN

A. All Prime contractors and their sub-contractors shall submit a completed Hourly Labor Rate Breakdown form for all trades or classifications of workers in their employ. A sample of the Hourly Labor Rate Breakdown form is included at the end of this Section.

1.6 APPLICATION FOR PAYMENT

A. Prepare payment application on AIA Form G732 - Application and Certificate for Payment, and AIA G703 – Continuation Sheet for G732.

B. Present required information in typewritten form and/or on electronic media printout.

C. Execute certification by signature of authorized officer.

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

E. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of Work.

F. Substantiating Data: When Construction Manager requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:

1. Affidavits and Insurance Certificates attesting to off site stored products.

2. Construction progress schedules.

3. Partial release from major subcontractors and vendors.

G. Submit four (4) copies of each application for payment to Construction Manager.

1.7 CHANGE PROCEDURES

A. Submittals: Submit name of individual authorized to receive change documents and be responsible for informing others in Contractor's employ or subcontractors of changes to the Work.

B. The Construction Manager will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by AIA A232, 2019 Edition, Paragraph 7.4, by issuing a supplemental instruction.

C. The Construction Manager may issue a Proposal Request, which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications.

D. The Contractor may propose a change by submitting request for change to the Construction Manager, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 60 00.

E. Stipulated Sum Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Construction Manager.

F. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work, which are not pre-determined, execute Work under a Construction Change Directive. Changes in Contract Sum or Contract Time will be computed as specified for Change Order.

G. Construction Change Directive: Construction Manager may issue a directive, signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum or Contract Time. Promptly execute the change.

H. Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Construction Manager will determine the change allowable in Contract Sum and Contract Time as provided in the Contract Documents.

I. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work. All work requested by the Construction Manager to be done on a Time and Material basis shall be signed for by the Construction Managers designated representative. It is the responsibility of the respective Contractor to have the daily work signed for. Any Time and Material slips not signed for on a daily basis may not be allowed.

J. Change Order Forms: AIA G701/CMa Change Order, or equal.

K. Execution of Change Orders: Construction Manager will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

L. Special attention is called to the following relating to start of work and time of completion.

1. It is imperative that all Prime Contractors take into consideration costs associated with expediting contracts, submittals, shop drawings, product approvals, deliveries, shift work, overtime, or any other related issue, to insure opening and operation of buildings in a manner sufficient to satisfy the Owner. This is not necessarily limited to but includes temporary protection, closures and services.

2. All contractors are advised that all costs for overtime and shift work are to be anticipated and carried in the Base Bid. No allowances will be made for overtime or shift work due to the lack of workers or equipment and material deliveries or improper project management by respective contractors.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

Hourly Labor Rate Breakdown:

Date:
Arcadis Project No.: 143500
Project: 2023 Capital Improvements Project – Phase 2&3

Prepared By:
Contractor:
Address:

Telephone:
Fax:

Trade Classification:
Local Union :
Effective Date - From:
To:

	% or Rate	Straight Time	Time + One Half Rate	Double Time Rate
3.1 Base Rate				
F.I.C.A.				
Federal Unemployment Tax				
State Unemployment Tax				
Disability Insurance				
Welfare Fund				
Pension Fund				
Defined Contribution				
Annuity Fund				
Association Dues				
Paid Holidays				
Worker's Compensation				
Public Liability				
Property Damage Insurance				
Education				
TOTALS				

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination.

B. Preconstruction conference.

C. Progress meetings.

D. Preinstallation conferences.

E. On-site manager.

F. Job superintendent.

G. Construction mobilization.

H. Equipment electrical characteristics and components.

I. Cutting and patching.

J. Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and work of the various sections of the project manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

1. Openings in new floors, walls, or roofs are to be cut by the contractor furnishing and installing the floor, wall, or roof material.
   a. Location of opening required shall be supplied by the Contractor in need of opening. The locations required shall be marked on a drawing by the contractor requiring the opening and provided to the contractor cutting the opening. Drawing shall indicate the centerline and dimensions of the opening in both directions.
   b. Structural or metal fabrications required to frame and properly support the openings shall be furnished and installed by the Contract No.1 - General Construction Contractor.

2. Openings in existing floors, walls, or roofs are to be cut by the Contractor requiring the opening.
   a. Structural or metal fabrications required to frame and properly support the openings shall be furnished and installed by contractor requiring the opening.

b. Employ a subcontractor certified by the roof manufacturer to perform work on the existing roof areas so that warranties in effect are maintained.

3. Trenches, at the interior of building footprints, whether existing or planned, for the Work of each contract shall be provided by each Contractor for its own Work.
   a. For trenches at existing interior concrete slabs on grade:
      1.) The Contractor requiring the trench shall mark out location of required trench.
      2.) The General Trades contractor shall saw cut and remove the concrete.
      3.) The Contractor requiring the trench shall excavate; install thw work, backfill and compact up to the subbase level.
      4.) The General Trades contractor shall install the base material and replace the concrete slab as detailed on the Drawings.
      5.) The General Trades Contractor shall patch floor finishes to match or as detailed or scheduled on Drawings.
      6.) All Contractors shall refer to Contract Documents for applicable specification sections and details.

4. Curbs shall be furnished and installed by the contractor requiring the opening.
   a. Flashing of the curb units to maintain watertight condition shall be the responsibility of each prime contractor when curbs are installed on existing roof areas.
   b. Flashing of the curb units to maintain watertight condition shall be the responsibility of Contract No. 5 – Roofing Construction Contractor when curbs are installed on new roof areas designated to be replaced as part of the work.
   c. Employ a subcontractor certified by the roof manufacturer to perform work on existing roof areas so that warranties in effect are maintained.

5. For openings required in new unit masonry assemblies, steel lintels shall be furnished and installed by the Contract No. 1 – General Construction Contractor
   a. Location of opening required shall be supplied by the Contractor in need of opening. The locations required shall be marked on a drawing by the contractor requiring the opening and provided to the Contract No. 1 General Construction Contractor. Drawing shall indicate the centerline and dimensions of the opening in both directions.

6. For openings and sleeves required at penetrations through existing concrete and unit masonry assemblies, steel lintels shall be furnished and installed by each prime contractor.

7. Louvers required in new unit masonry assemblies shall be furnished and installed by the contractor requiring the louver.
    a. Location of louver opening required shall be supplied by the Contractor in need of opening unless already specifically indicated on the Contract Documents. The locations required shall be marked on a drawing by the contractor requiring the opening and provided to the Contract No. 1- General Contractor. Drawing shall indicate the centerline and dimensions of the opening in both directions.

8. Louvers required in existing unit masonry assemblies shall be furnished and installed by the contractor requiring the louver. Opening and structural support for the louver shall be provided by the contractor requiring the louver.

9. Sleeves required at penetrations through new concrete and masonry shall be furnished by the contractor in need of the penetration to the Contract No. 1 – General Construction Contractor.
    a. Location of sleeves required shall be supplied by the Contractor in need of sleeve placement. The locations required shall be marked on a drawing by the contractor requiring the opening and provided to the Contract No. 1 - General Construction Contractor. Drawing shall indicate the centerline and dimensions of the opening in both directions.
    b. Location drawings and sleeves shall be delivered by the contractor needing the sleeve placement to the Contract No. 1 - General Construction Contractor a minimum of 96 hours prior to concrete pour.

10. Sleeves required at penetrations through concrete and masonry in areas of existing construction shall be furnished by each prime contractor.

B. Verify utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work, which is indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and cleanup of Work of separate Sections in preparation for Substantial Completion and for portions of work designated for Owners occupancy.

F. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 PRECONSTRUCTION CONFERENCE

A. Construction Manger will schedule a conference after Notice to Proceed.

B. Attendance Required: Owner, Construction Manager, Architect, Engineer, and Contractors.

C. Agenda:

1. Channels and procedures for communications.

2. Organizational arrangement of Contractors' forces and personnel, those of subcontractors, material suppliers, Owner, Construction Manager, and Architect/Engineers.

3. Distribution of Contract Documents.

4. Submission of list of Subcontractors, list of products, Schedule of Values, and progress schedule.

5. Designation of personnel representing the parties in Contract, Construction Manager, and the Architect/Engineer.

6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal requests, Change Orders, and Contract Closeout procedures.

7. Scheduling, including sequence of critical Work.

8. Use of premises by Owner and Contractor.

9. Owner's requirements and occupancy.

10. Construction facilities and controls provided by Contractor.

11. Temporary utilities provided by Contractor.

12. Security and housekeeping procedures.

13. Schedules.

14. Procedures and Scheduling for testing by Geotechnical and Environmental Engineer.

15. Procedures for maintaining record documents.

16. Requirements for start-up of equipment.

17. Inspection and acceptance of equipment put into service during construction period.

1.4 PROGRESS MEETINGS

A. Construction Manager will Schedule and administer meetings throughout progress of the Work at weekly intervals.

B. Construction Manager to make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies to Owner, participants, and those affected by decisions made.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Construction Manager, Project Administrator, Architect, Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meetings.

2. Review of Work progress.

3. Field observations, problems, and decisions.

4. Identification of problems impeding planned progress.

5. Review of submittals schedule and status of submittals.

6. Review of off-site fabrication and delivery schedules.

7. Maintenance of progress schedule.

8. Corrective measures to regain projected schedules.

9. Planned progress during succeeding work period.

10. Coordination of projected progress.

11. Maintenance of quality and work standards.

12. Effect of proposed changes on progress schedule and coordination.

13. Other business relating to Work.

1.5 PREINSTALLATION CONFERENCES

A. When required in individual specification sections, convene a preinstallation conference at Project site prior to commencing Work of the specific section.

B. Require attendance of parties directly affecting, or affected by, Work of the specific Section.

C. Notify Construction Manager seven (7) calendar days in advance of conference date.

D. Contractor to prepare agenda, preside at conference, record minutes, and distribute copies within four days after conference to participants, with two copies to Construction Manager.

E. Review conditions of installation, preparation and installation procedures, and coordination with related work.

1.6 ON-SITE MANAGER

A. On-site Manager: Construction Manager's On-site Manager.

1.7 JOB SUPERINTENDENT

A. Each Prime Contractor shall provide a qualified Job Superintendent with experience in supervision of five or more projects similar in size and scope of work.

B. Job Superintendent shall be responsible for full-time field supervision, coordination of contractors' and subcontractors' work forces, and completion of the work, as required in the Contract Documents. **Each Prime Contractor's full-time superintendent is expected to perform supervisory and coordination activities of the contractor's own forces and subcontractors at all times. The General Construction Contractor's superintendent will not be a "working" superintendent, i.e. performing any of the actual installation of the work. Their sole position on the project is to monitor, coordinate and supervise the work of the contractor and the contractor's subcontractors.**

C. Prime Contractor's Superintendent is required to be on site at all times. Subcontractors are working regardless if Prime Contractor's own forces are on site.

D. Each Prime Contractor shall submit Job Superintendent's resume, documenting prior experience, if requested by Owner, Architect, or Construction Manager.

E. Architect, Construction Manager and Owner shall have the right to require Contractor to dismiss from the project any Superintendent whose performance is not satisfactory.

F. Contractor shall not replace the Superintendent without the consent of the Construction Manager, Architect and/or Owner.

1.8 CONSTRUCTION MOBILIZATION

A. Each Contractor shall cooperate with the On-site Manager, Construction Manager and Owner in allocation of mobilization areas of site for sheds, for access, traffic, and parking facilities.

B. During construction, each Contractor shall coordinate use of site and facilities through the On-site Manager, Architect and Owner.

C. Each Contractor shall comply with procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and resolution of ambiguities and conflicts as established at Pre-Construction Meeting.

2 PART 2 PRODUCTS

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Motors: Specific motor type is specified in individual specification sections.

B. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.

C. Cord and Plug: Furnish minimum 6- foot (2 m) cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

3 PART 3 EXECUTION

3.1 CUTTING AND PATCHING

A. Each Prime Contractor shall employ skilled and experienced installers to perform cutting and patching.

B. Unless otherwise indicated each Prime Contractor shall be responsible to infill openings left in existing floors, walls, and ceilings from removals. Infill shall be made with like materials and finishes to match adjacent conditions.

C. At any location existing finishes are damaged or removed, as a result of work the applicable Prime Contractor shall be responsible to make appropriate repairs to match existing facilities.

D. Submit written request in advance of cutting or altering elements which affects:

1. Structural integrity of element.

2. Integrity of weather-exposed or moisture-resistant elements.

3. Efficiency, maintenance, or safety of element.

4. Visual qualities of sight-exposed elements.

5. Work of Owner or separate contractor.

E. Execute cutting, fitting, and patching, including excavation and fill, to complete Work, and to:

1. Fit the several parts together, to integrate with other Work.

2. Uncover Work to install or correct ill-timed Work.

3. Remove and replace defective and non-conforming Work.

4. Remove samples of installed Work for testing.

5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

F. Execute work by methods to avoid damage to other Work and provide proper surfaces to receive patching and finishing.

G. Cut masonry and concrete materials using masonry saw or core drill.

H. Restore Work with new products in accordance with requirements of Contract Documents.

I. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

J. Maintain integrity of wall, ceiling, or floor construction, completely seal voids.

K. At penetrations of fire rated walls, partitions, ceiling or construction, completely seal voids with fire rated or fire-resistant material in accordance with Section 07 84 00, to full thickness of penetrated element.

L. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

M. Identify any hazardous substance or condition exposed during the Work to the Construction Manager for decision or remedy.

3.2 SPECIAL PROCEDURES

A. Materials: As specified in product Sections; match existing products and work for patching and extending work.

B. Employ skilled and experienced installers to perform work.

C. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.

D. Remove, cut, and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to original condition.

E. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.

F. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work to match existing adjacent work in texture and appearance.

G. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Construction Manager.

H. Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition for Construction Manager review. Request instructions from Construction Manager.

I. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfections.

J. Finish surfaces as specified in individual product Sections.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed products list.

D. Shop drawings.

E. Product data.

F. Samples.

G. Certificates.

H. Manufacturers' instructions.

I. Manufacturers' field reports.

1.2 SUBMITTAL PROCEDURES

A. Transmit each submittal with standard submittal form, shown at the end of this Section.

B. Sequentially number the transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.

C. Identify Project, Contractor, Subcontractor, or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, appropriate to submittal.

D. Apply Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project and deliver to Construction Manager at business address. Coordinate submission of related items.

F. For each submittal review, allow fifteen (15) days excluding delivery time to and from Contractor.

G. Identify variations from Contract Documents and Product or system limitations, which may be detrimental to successful performance of the completed Work.

H. Allow space on submittals for Contractor, Construction Manager and Architect/Engineer review stamps.

I. When revised for resubmission, identify changes made since previous submission.

J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

K. Submittals not requested will not be recognized or processed.

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule in duplicate within 15 calendar days after date established in Notice to Proceed for Construction Manager review.

B. Revise and resubmit as required.

C. Submit revised schedules as required by Construction Manager with each application for payment identifying changes since previous version.

D. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.

E. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

F. Submit a horizontal bar chart with separate line for each major section of Work or operation, identifying first workday of each week.

G. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

H. Indicate estimated percentage of completion for each item of Work at each submission.

I. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished under Allowances. Indicate dates reviewed submittals will be required from Architect/Engineer. Indicate decision dates for selection of finishes.

J. Each Prime Contractor shall be required to submit, within 15 calendar days of award of contract, a schedule showing "duration" of major activities. "Duration" shall not be specific dates but is defined as the amount of time (calendar days, weeks, months) to perform specific tasks. The amount of tasks shall accurately reflect enough activities to collate with other contracts, to determine overlaps and conflicts in scheduling, and accurately describe the scope of work within each contract. Contractors shall indicate earliest start date per task and accurately reflect impact of submittals, product review, material and equipment delivery, and any other issues that may impact start of Work.

K. Each Prime Contractor shall comply with completion of Work within each duration submitted and approved. Quantity of labor required is the choice of the contractor but should be sufficient to insure completion within the duration submitted and approved. Workdays per task shall be required to accurately produce a Critical Path Method Schedule.

L. A master schedule shall be created by Contract No. 1 - General Construction Contractor using information provided by each Prime Contractor. The master schedule shall be provided to each Prime Contractor.

M. Each Prime Contractor shall be required to attend meetings with the Construction Manager a minimum of once per week for the duration of the project to cooperatively ensure the project schedule is being maintained.

N. Each Prime Contractor shall be responsible to coordinate their respective work with any other work that may affect them. Additional meetings may be required, in addition to meetings referenced in Paragraph 1.3.M above. All Prime Contractors will be required to share the results of such meetings with the Construction Manager, for the purposes of updating and coordinating schedules.

O. All potential schedule conflict items shall immediately be reported, together with a proposed resolution, to the Construction Manager.

1.4 PROPOSED PRODUCTS LIST

A. Within 15 calendar days after date of Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.5 SHOP DRAWINGS

A. Shop Drawings: Submit electronically to Construction Manager for review by the Architect/Engineer for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents. Provide copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01 70 00.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service or functional equipment and appliances.

C. After review, distribute in accordance with Submittal Procedure article above and provide copies for Record Documents described in Section 01 70 00 – Execution Requirements.

1.6 PRODUCT DATA

A. Product Data: Submit electronically to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents. Provide copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01 70 00.

B. Submit one (1) copy of Material Safety Data Sheet for all products used on the project, which will be retained by the Construction Manager.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.

D. After review, distribute in accordance with Submittal Procedures article above and provide copies for Record Documents described in Section 01 70 00 – Execution Requirements.

1.7 SAMPLES

A. Samples: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents. Provide copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01 70 00.

B. Samples for Selection as Specified in Product Sections:

1. Submit to Architect/Engineer for aesthetic, color, or finish selection.

2. Submit samples of finishes from full range of manufacturers' colors, textures, and patterns for Architect/Engineer selection.

3. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article for record documents purposes described in Section 01 70 00.

C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

D. Include identification on each sample, with full Project information.

E. Submit the number or samples specified in individual specification Sections, two (2) of which will be retained by Construction Manager.

F. Reviewed samples which may be used in the Work are indicated in individual specification Sections.

G. Samples will not be used for testing purposes unless specifically stated in specification section.

1.8 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.9 MANUFACTURERS' FIELD REPORTS

A. Submit reports for Construction Manager's benefit as contract administrator or for Owner.

B. Submit report in duplicate within thirty (30) days of observation to Construction Manager for information.

C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.10 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification Sections, submit manufacturers' certificate to Construction Manager for review, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product but must be acceptable to Construction Manager and Architect/Engineer.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

Arcadis Architects, Engineers and
Landscape Architects, a New York
General Partnership
59-61 Court Street
Suite 300
Binghamton, NY 13901
Phone: 607 772 0007

SUBMITTAL FORM

Project Name: Odessa-Montour CSD
2023 Capital Improvements Phase 2&3

Project No. 143500

Submittal Item No.:		Section:	
Date:		Drawing/Detail:	
Submittal:			
Contractor:			
Subcontractor or Supplier:			

Item Being Submitted:

Product Data	☐	Shop Drawings	☐
Color Charts	☐	Samples	☐
Schedule	☐	Test Reports	☐
Warranties	☐	O&M Manuals	☐
Other			

☐		Submittal is specified item
☐		Submittal is not specified item. I, the Contractor, certify that the item submitted is identical to specified item with the following exceptions:
	1.	
	2.	
	3.	
		I as the contractor further certify that I will pay all costs required by work of other trades to accommodate this substitution and that I will not pass along any additional or unforeseen expenses required to accommodate this substitution by my own forces or forces of my sub contractors.
		Lastly, I acknowledge that the Architect/Engineer reserves the right to make the final decision regarding the equality of the submitted product to that of the specified item.
	The reason for this substitution is:	
	☐	The specified item has been discontinued or is no longer available as specified.
	☐	I am proposing this substitution as a cost saving measure and will provide a credit if it is accepted for use in the project.

_____
Signed

_____
Contractor

END OF SECTION

SECTION 01 40 00

QUALITY CONTROL

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality control and control of installation.

B. Tolerances.

C. References.

D. Field Samples.

E. Mock-up requirements.

F. Testing and inspection services.

G. Manufacturers' field services.

H. Examination.

I. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including each step-in sequence.

C. When manufacturers' instructions conflict with Contract Documents, request clarification from Construction Manager before proceeding.

D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify field measurements as indicated on Shop Drawings or as instructed by manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Construction Manager before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. When specified reference standards conflict with Contract Documents, request clarification from Construction Manager before proceeding.

E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Construction Manager and Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.5 FIELD SAMPLES

A. Install field samples at the site as required by individual specification Sections for review.

B. Acceptable samples represent a quality level for the Work.

C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Construction Manager.

1.6 MOCK-UP REQUIREMENTS

A. Tests will be performed under provisions identified in this section and identified in respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be comparison standard for remaining Work.

D. Where mock-up has been accepted by Construction Manager and Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Construction Manager.

1.7 TESTING AND INSPECTION SERVICES

A. Owner will appoint, employ, and pay for services of an independent firm to perform testing and inspection.

B. The independent firm will perform inspections, tests, and other services specified in individual specification Sections and as required by the Construction Manager.

C. Reports will be submitted by the independent firm to the Construction Manager, in triplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

D. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Construction Manager and independent firm 48 hours prior to expected time for operations requiring services.

2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

E. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

F. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Construction Manager. Payment for re-testing will be charged to the Contractor by deducting inspection or testing charges from the Contract Sum/Price.

G. Agency Responsibilities:

1. Test samples of mixes submitted by Contractor.

2. Provide qualified personnel at site. Cooperate with Construction Manager and Contractor in performance of services.

3. Perform specified sampling and testing of products in accordance with specified standards.

4. Ascertain compliance of materials and mixes with requirements of Contract Documents.

5. Promptly notify Construction Manager and Contractor of observed irregularities or non-conformance of Work or products.

6. Perform additional tests required by Construction Manager.

7. Attend preconstruction meetings and progress meetings.

H. Agency Reports: After each test, promptly submit three (3) copies of report to Construction Manager and to Contractor. When requested by Construction Manager, provide interpretation of test results. Include the following:

1. Date issued.

2. Project title and number.

3. Name of inspector.

4. Date and time of sampling or inspection.

5. Identification of product and specifications section.

6. Location in Project.

7. Type of inspection or test.

8. Date of test.

9. Results of tests.

10. Conformance with Contract Documents.

I. Limits on Testing Authority:

1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

2. Agency or laboratory may not approve or accept any portion of the Work.

3. Agency or laboratory may not assume duties of Contractor.

4. Agency or laboratory has not authority to stop the Work.

1.8 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Construction Manager thirty (30) calendar days in advance of required observations. Observer subject to approval of Construction Manager.

C. The manufacturer's representative shall be certified to be qualified in design, installation, and servicing of the product. Personnel involved only in sales do not qualify. The manufacturer's representative shall be available to assist and answer questions.

D. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.

E. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

F. Refer to Section 01 33 00 – Submittal Procedures, Manufacturers' Field Reports article.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substrate in contact or bond.

END OF SECTION

SECTION 01 40 01

SPECIAL INSPECTIONS AND TESTING

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 GENERAL REQUIREMENTS

A. Special Inspections and Testing shall be in accordance with Chapter 17 of the 2018 International Building Code.

B. The program of Special Inspection and Testing is a Quality Assurance program intended to ensure that the work is performed in accordance with the Contract Documents.

C. This Specification Section is intended to inform the Contractor of the Owner's quality assurance program and the extent of the Contractor's responsibilities. This Specification Section also serves to inform the Special Inspector and Inspection and Testing Agents of their requirements and responsibilities.

1.3 SCHEDULE OF INSPECTIONS AND TESTS

A. Required inspections and tests are described in the Schedule at the end of the Statement of Special Inspections.

1.4 QUALIFICATIONS

A. The Special Inspector shall have extensive experience in the building design and construction industry, be professionally trained in engineering, and be approved by the Design Professional in Responsible Charge and the Code Enforcement Official.

B. The Inspection and Testing Agents, including testing laboratories, shall be approved by the Owner's Representative and the Code Enforcement Official.

C. The following specific requirements for Inspection and Testing Agents may be waived by the Code Enforcement Official.

1. Inspectors performing inspections of soils and foundations shall have an education and background in geotechnical engineering.

2. The testing laboratories shall maintain a full time licensed Professional Engineer on staff who shall certify all test reports. This Engineer shall be responsible for the training of the testing technicians and shall be in responsible charge of the field and laboratory testing operations.

3. Technicians performing sampling and testing of concrete shall be ACI certified Concrete Field-Testing Technicians - Grade 1.

4. Inspectors performing inspections of concrete work such as inspections of concrete placement, batching, reinforcing placement, curing and protection, shall be ACI certified Concrete Construction Inspectors or ICBO certified Reinforced Concrete Special Inspector in lieu of being a licensed P.E. or EIT.

5. Inspectors performing inspections of masonry shall be ICBO certified Structural Masonry Special Inspectors.

6. Inspectors performing inspections of structural steel shall be individuals who are either licensed Professional Engineers (P.E.) or Engineers-In-Training (EIT) with an education and background in structural engineering, and ICBO certified as Structural Steel Special Inspectors.

7. Technicians performing visual inspection of welding shall be AWS Certified Welding Inspectors or ICBO certified Structural Steel and Welding Special Inspectors. Technicians performing non-destructive testing such as ultrasonic testing, radiographic testing, magnetic particle testing, or dye-penetrant testing shall be certified as an ASNT-TC Level II or Level III Technician.

8. Inspectors performing inspections of spray fireproofing shall be ICBO certified Spray-Applied Fireproofing Special Inspectors.

9. Technicians performing standard tests described by specific ASTM Standards shall have training in the performance of such tests and must be able to demonstrate either by oral or written examination competence for the test to be conducted. They shall be under the supervision the Owner's Representative and shall not be permitted to independently evaluate test results.

1.5 SUBMITTALS

A. The Special Inspector and Inspection and Testing Agents shall submit to the Owner's Representative and the Code Enforcement Official for review a copy of their qualifications which shall include the names and qualifications of each of the individual inspectors and technicians who will be performing inspections or tests.

B. The Special Inspector and Inspection and Testing Agents shall disclose any past or present business relationship or potential conflict of interest with the Contractor or any of the Subcontractors whose work will be inspected or tested.

1.6 PAYMENT

A. The Owner will engage and pay for the services of the Special Inspector and Inspection and Testing Agents.

B. If any materials which require Special Inspections are fabricated in a plant which is not located within 100 miles of the project, the Contractor shall be responsible for the travel expenses of the Special Inspector or Inspection and Testing Agents.

C. The Contractor shall be responsible for the cost of any retesting or reinspection of work which fails to comply with the requirements of the Contract Documents.

1.7 CONTRACTOR RESPONSIBILITIES

A. The Contractor shall cooperate with the Special Inspector and the Inspection and Testing Agents so that the Special Inspections and Testing may be performed without hindrance.

B. The Contractor shall provide adequate OSHA-compliant access for the Special Inspector and the Inspection and Testing Agents, for them to perform their work.

C. The Contractor shall review the Statement of Special Inspections and shall be responsible for coordinating and scheduling inspections and tests. The Contractor shall notify the Special Inspector or Inspection and Testing Agents at least 24 hours in advance of a required test, and 3 working days in advance of a required inspection. Un-inspected work that required inspection may be rejected solely on that basis.

D. 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, storage and curing of test samples.

E. The Contractor shall keep at the project site the latest set of construction drawings, field sketches, approved shop drawings, and specifications for use by the Special Inspector and Inspection and Testing Agents.

F. 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. All work that is to be subjected to Special Inspection and Testing shall first be reviewed by the Contractor's quality control personnel.

G. The Contractor shall be solely responsible for construction site safety.

1.8 LIMITS ON AUTHORITY

A. The Special Inspector or the Inspection and Testing Agents may not release, revoke, alter, or enlarge on the requirements of the Contract Documents.

B. The Special Inspector and the Inspection and Testing Agents will not have control over the Contractor's means and methods of construction.

C. The Special Inspector or the Inspection and Testing Agents shall not be responsible for construction site safety.

D. The Special Inspector or the Inspection and Testing Agents have no authority to stop the work.

1.9 STATEMENT OF SPECIAL INSPECTIONS

A. The Statement of Special Inspections will be prepared by the Owner's Representative in Responsible Charge.

B. The Statement of Special Inspections shall be submitted to the Code Enforcement Official with the application for Building Permit.

1.10 RECORDS AND REPORTS

A. Inspection and Testing Agents shall prepare detailed daily reports of each inspection or test and submitted to the Special Inspector. Reports shall include:

1. Date of test or inspection.

2. Name of inspector or technician.

3. Location of specific areas tested or inspected.

4. Description of test or inspection and results.

5. Applicable ASTM standard.

6. Weather conditions (for site inspections or testing).

7. Signature of inspector, or of the individual overseeing the testing.

B. The Special Inspector shall submit interim reports to the Code Enforcement Official, Owner's Representative, and Contractor at the end of each week which include all inspections and test reports received that week.

C. The Special Inspector shall report any discrepancies from the Contract Documents found during an inspection. If the discrepancies are not corrected during the inspection, the Special Inspector shall notify the Owner's Representative and Code Enforcement Official. Reports shall document all discrepancies identified and the corrective action taken.

D. The Testing Laboratory shall promptly notify the Special Inspector and the Owner's Representative by telephone, fax or email of any test results which fail to comply with the requirements of the Contract Documents.

E. The Inspection and Testing Agents shall submit reports to the Special Inspector within 7 days of the inspection or test. Handwritten reports may be submitted if final typed copies are not available.

F. At the completion of the work requiring Special Inspections, each Inspection and Testing Agent, including laboratories, shall provide a statement to the Special Inspector that all work was completed in substantial conformance with the Contract Documents and that all appropriate inspections and tests were performed.

1.11 FINAL REPORT OF SPECIAL INSPECTIONS

A. The Final Report of Special Inspections shall be completed by the Special Inspector and submitted to the Owner's Representative and Code Enforcement Official prior to the issuance of a Certificate of Use and Occupancy.

B. The Final Report of Special Inspections will certify that all required inspections have been performed and will itemize any discrepancies that were not corrected or resolved.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

4 PART 4 SCHEDULE

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
A. Steel Construction						
1. Material verification of high-strength bolts, nuts and washers.		X	Applicable ASTM material specifications. AISC 360, Section A3.3	1705.2 1705.12.1	☐	
2. Inspection of high-strength bolting.	X	X	AISC 360, Section M2.5	1705.2 1705.12.1	☐	
3. Material verification of structural steel.			ASTM A 6 or A 568	1705.2, 1705.12.1	☐	
4. Material verification of weld filler materials.			AISC 360, Section A3.5	1705.2 1705.12.1	☐	
5. Inspection of welding:				1705.2		
a. Structural steel	X	X	AWS D1.1, D1,3	1705.2 1705.12.1	☐	
b. Reinforcing steel	X	X	AWS D1.4 ACI 318: 26.6.4	1705.2	☐	
6. Inspection of steel frame joint details.		X		1705.2 1705.12.1	☐	

B. Concrete Construction							
1. Inspection of reinforcing steel, including prestressing tendons, and placement.		X	ACI Ch 20, 25.2, 25.3, 26.6.1-26.6.3		1705.3, 1908.4,	☐	
2. Inspection of reinforcing steel welding.			AWS D1.4; ACI 318: 26.6.4		1705.3	☐	
3. Inspection of bolts to be installed in concrete prior to and during placement.	X		ACI 318: 17.8.2		1705.3	☐	
4. Verify use of required design mix.		X	ACI 318: Ch. 19, 26.4.3, 26.4.4		1705.3, 1904.1, 1904.2 1908.2, 1908.3	☐	
5. Sampling fresh concrete: slump, air content, temperature, strength test specimens.	X		ASTM C 172, C 31; ACI 318: 26.5, 26.12		1705.3, 1908.10	☐	
6. Inspection of placement for proper application techniques.	X		ACI, 318: 26.5		1705.3, 1908.6, 1908.7, 1908.8	☐	
7. Inspection for maintenance of specified curing temperature and techniques.		X	ACI, 318: 26.5.3-26.5.5		1705.3 1908.9	☐	
8. Inspection of prestressed concrete.	X		ACI 318: 26.10		1705.3	☐	
9. Erection of precast concrete members.		X	ACI 318: 26.9		1705.3	☐	
10. Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.		X	SVI 318: 6.2		1704.4, 1906.2	☐	
11. Inspection of formwork		X	ACI 318:26.11.2(b)			☐	
C. Masonry Construction							
L1 = Level 1 Inspection required for nonessential facilities.			ACI 530/ ASCE 5/TMS 402, Ch. 35	ACI 530.1/ ASCE 6/TMS 602, Ch. 35			

L2 = Level 2 Inspection required for essential facilities. In general, schools are not considered essential facilities unless they are a designated emergency shelter.			ACI 530/ASCE 5/TMS 402, Ch. 35	ACI 530.1/ASCE 6/TMS 602, Ch. 35			
1. Verify to ensure compliance:							
a. Proportions of site prepared mortar and grout.		L1 L2		2.6A	1705.4	☐	
b. Placement of masonry units and construction of mortar joints.		L1 L2		3.3B	1705.4	☐	
c. Location and placement of reinforcement, connectors, tendons, anchorages.		L1 L2	 Sec. 1.13	3.4, 3.6A 3.4, 3.6A	1705.4 1705.4	☐	
d. Prestressing technique. Grout space prior to grouting.	 L2	L1		3.6B 3.2D	1705.4 1705.4	☐	
e. Grade and size of restressing tendons and anchorages. Placement of grout.	 L2	L1		2.4B, 2.4H 3.5	1705.4 1705.4	☐	
f. Grout specs prior to grouting.	L2			3.6C	1705.4	☐	
2. Inspection shall verify:						☐	
a. Size and location of structural elements.		L1 L2		3.3G	1705.4	☐	
b. Type, size, and location of anchors.	L2	L1	Sec. 1.2.2(e), 2.1.4, 3.1.6		1705.4	☐	
c. Specified size, grade, and type of reinforcement.		L1 L2	Sec. 1.13	2.4, 3.4	1705.4	☐	
d. Welding of reinforcing bars.	L1 L2		2.1.7.10.2, 3.3.3.4(b)		1705.4	☐	
e. Cold/hot weather protection of masonry construction.		L1 L2		1.8C, 1.8D	1705.4 2101.03 2105.1	☐	
f. Prestressing force measurement and application.	L2	L1		3.6B	1705.4	☐	

3. Verification prior to grouting.	L2	L1	1.13	3.2D, 3.4, 2.6B,3.3B, 1.4	1705.4 1705.4, 2105	☐	
4. Grout placement.	L1			3.5, 3.6C	1705.4	☐	
5. Preparation of grout specimens, mortar specimens, and/or prisms.	L1 L2			1.4	1705.4 2105.1	☐	
6. Compliance with documents and submittals.		L1 L2		1.5	1705.4	☐	
D. Wood Construction:							
1. Fabrication process of prefabricated wood structural elements and assemblies		X			1705.5	☐	
2. High-load diaphragms designed in accordance with Table 2306.2.					1705.5.1	☐	
E. Soils					1705.6	☐	
F. Pile Foundations.					1705.7	☐	
G. Pier Foundations					1705.8	☐	
1. Helical Pier Foundations					1705.9		
H. Sprayed Fire-Resistant Materials							
1. Structural member surface conditions.					1705.14.2	☐	
2. Application.					1705.14.3	☐	
3. Thickness.				ASTM E 605	1705.14.4	☐	
4. Density.				ASTM E 605	1705.14.5	☐	
5. Bond strength.		X		ASTM E 736	1705.14.6	☐	
I. Mastic and Intumescent Fire-Resistant Coatings					1705.15		
J. Exterior Insulation and Finish Systems (EIFS)					1705.16	☐	
K. Fire-resistant penetrations and joints.					1705.17	☐	
L. Smoke Control					1705.18	☐	
M. Special Inspections for Seismic Resistance							
1. Structural steel.	X			AISC 341	1705.12.1	☐	
2. Structural wood.	X				1705.12.2	☐	
3. Cold-formed steel framing.		X			1705.12.3 1705.12.9	☐	
4. Designated Seismic Systems		X			1705.12.4	☐	
5. Architectural components.		X			1705.12.5	☐	

6. Storage Racks		X		1705.12.7	☐	
7. Plumbing, mechanical, and electrical components		X		1705.12.6		
8. Seismic isolation system.		X		1705.12.8	☐	
N. Structural Testing for Seismic Resistance						
1. Nonstructural Components				1705.13.2	☐	
2. Designated seismic systems.				1705.13.3	☐	
3. Structural steel.			AISC 341, AWS D1.1	1705.13.1	☐	
4. Seismic isolation systems.			Section 17.8 of ASCE 7	1705.13.4	☐	
O. Design Strength of Materials				1706	☐	
P. In-Situ Load Tests				1708	☐	
Q. Preconstruction Load Tests				1709	☐	
R. Special Inspections for Wind Resistance				1705.11		
1. Structural Wood				1705.11.1	☐	
2. Cold Formed Steel light-frame construction.				1705.11.2	☐	
3. Wind Resisting components; Roofing, Exterior Wall covering.				1705.11.3	☐	

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Description.

B. Building Codes.

C. Labor Laws.

1.2 DESCRIPTION

A. The following regulatory requirements shall be considered as part of the Contract Documents and shall apply to all contractors and to all Divisions and Sections of the specifications.

1.3 BUILDING CODES

A. Contractor shall conform to and abide by all Local, State and Federal building and sanitary laws, rules and regulations, and industrial safety laws. Such laws shall be considered as an essential part of these Specifications and, in the absence of definite requirements herein, the provisions of such rules and regulations shall be observed by the contractor. If the specifications are at variance therewith, contractor shall so notify the Construction Manager promptly. Should the contractor perform any work contrary to such laws, ordinances, rules and regulations, they shall bear all costs arising therefrom.

1.4 ACCESSIBILITY LAW

A. Access for persons with physical disabilities: Comply with Americans with Disability Act (ADA), including the ADA accessibility guidelines. Documents are available from the U. S. Department of Justice, Civil Rights Division, (202) 514-0301 and from the Architectural and Transportation Barriers Compliance Board (ATBCB), (800) USA-ABLE.

1.5 LABOR LAWS

A. All contractors and subcontractors performing work at the sites of these projects shall comply with the applicable provisions of the "Labor Law", as amended, of the State of New York, including the following provisions:

1. PROHIBITION AGAINST DISCRIMINATION:
   In accordance with the provisions of Section 220-e of the Labor Law, the contractor agrees:
   a. That in the hiring of employees for the performance of work under this contract or any subcontract hereunder, no contractor, subcontractor, nor any person acting on behalf of such contractor

or subcontractor, shall be reason of age, race, creed, color, national origin, sexual orientation, gender identity or expression, military status, sex, disability, predisposing genetic characteristics, familial status, marital status, or status as a victim of domestic violence discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates;

b. That no contractor, subcontractor, nor any person on their behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of age, race, creed, color, national origin, sexual orientation, gender identity or expression, military status, sex, disability, predisposing genetic characteristics, familial status, marital status, or status as a victim of domestic violence;

c. That there may be deducted from the amount payable to the contractor by the state or municipality under this contract a penalty of five 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;

d. That this contract may be cancelled or terminated by the state or municipality, and all moneys due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms of conditions of this section of the contract; and

e. The aforesaid provisions of this section covering every contract for or on behalf of the state or a municipality for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York. The Contractor agrees to comply with the provisions of Section 291-299 of the Executive Law, the Civil Rights Law and any and all regulations issued pursuant thereto.

2. EQUAL OPPORTUNITY:

During the performance of this contract, the contractor agrees as follows:

a. The Contractor will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, sexual orientation, gender identity or expression, military status, sex, disability, predisposing genetic characteristics, familial status, marital status, or status as a victim of domestic violence, and will take affirmative action to insure that they are afforded equal employment opportunities without discrimination because of age, race, creed, color, national origin, sexual orientation, gender identity or expression, military status, sex, disability, predisposing genetic characteristics, familial status, marital status, or status as a victim of domestic violence; such action shall be taken with reference, but not be limited to: recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training.

b. The contractor will send to each labor union or representative of workers with which they have or are bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commission for Human Rights, advising such labor union or representative of the contractor's agreement under clause (a) through (g) (hereinafter called "non-discrimination clauses"). If the contractor was directed to do so by the contracting agency as part of the bid specification of this contract, the contractor shall require such labor union or representative to furnish them with written statement that such labor union or representative will not discriminate because of age, race, creed, color, national origin, sexual orientation, gender identity or expression, military status, sex, disability, predisposing genetic characteristics, familial status, marital status, or status as a victim of domestic violence and that such labor union or representative either will affirmatively cooperate, within the limits of its legal and contractual authority, in the implementation of the policy and provisions of these non-discrimination clauses or that it consents and agrees that recruitment, employment and the terms and conditions of employment under this contract shall be in accordance with the purposes and provisions of these non-discrimination clauses. If such labor union or representative fails or refuses to comply with such a request that it furnish such a statement, the contractor shall promptly notify the State Commission for Human Rights of such failure or refusal.

c. The Contractor will post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commission for Human Rights setting forth the substance of the provision of clauses (a) and (b) and such provisions of the State's Laws against discrimination as the State Commission for Human Rights shall determine.

d. The Contractor will state, in all solicitations and advertisements for employees placed by or on behalf of the contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of age, race, creed, color, national origin, sexual orientation, gender identity or expression, military status, sex, disability, predisposing genetic characteristics, familial status, marital status, or status as a victim of domestic violence.

e. The Contractor will comply with the provisions of Section 291-299 of the Executive Law and Civil Rights Law, will furnish all information and reports deemed necessary by the State Commission for Human Rights under these non-discrimination clauses and such sections of the Executive Law, and will permit access to their books, records and accounts by the State Commission for Human Rights, the Attorney General and Industrial Commission for purposes of investigation to ascertain compliance with these non-discrimination clauses and such sections of the Executive Law and Civil Rights Law.

f. This contract may be forthwith cancelled, terminated or suspended in whole or in part, by the contracting agency upon the basis of a finding made by the State Commission for Human Rights that the Contractor has not complied with these non-discrimination clauses, and the Contractor may be declared ineligible for future contracts made by or on behalf of the State or a public authority or agency of the State Commission for Human Rights that they have established and are carrying out a program in conformity with the provisions of these non-discrimination clauses. Such finding shall be made by the State Commission for Human Rights after conciliation efforts by the Commission have failed to achieve compliance with these non-discrimination clauses and after a verified complaint has been filed with the commission, notice thereof has been given to the Contractor and an opportunity has been afforded them to be heard publicly before three members of the Commission. Such sanctions may be imposed, and remedies invoked independently of or in addition to sanctions and remedies otherwise provided by law.

g. The Contractor will include the provisions of clauses (a) through (f) in every subcontract or purchase order in such manner that such provisions will be binding upon each subcontractor or vendor as to operations to be performed within the State of New York. The Contractor will take such action in enforcing such provisions of such subcontract or purchase order as the contracting agency may direct, including sanctions or remedies for non-compliance. If the contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor shall promptly so notify the Attorney General, requesting them to intervene and protect the interests of the State of New York.

3. AFFIRMATIVE ACTION:

As used herein the work and designation "Affirmative Action" includes, but are not limited to the following:

a. Except as otherwise provided by this contract, the Contractor shall be the judge as to the qualifications of all applicants for employment on or in connection with the construction of the project and where a collective bargaining agreement provides for referral by the union of "qualified journeymen", the Contractor should evaluate the qualifications of such applicants.

b. The Contractor will not limit recruitment or employment, directly or indirectly, to members or referrals or labor organizations which do not have minority group members for employment or do not indicate willingness to admit into journeymen membership a prospective employee or applicant for employment who is a member of a minority group or to permit their employment on the construction site of the project.

c. The Contractor will notify community agencies and communication media associates with minority groups of opportunities for employment.

d. To the extent permitted by law and the applicable collective bargaining agreement not in violation thereof, the contractor will recruit, evaluate and hire, without regard to race, creed, color, age, sex, national origin, or union membership, it being understood that a union may require a new employee to join the union within eight (8) days after they commence work and it being further understood that the contractor may retain in employment any employee they deem qualified whose tender of initiation fees and dues have been refused by the union.

e. To the extent permitted by law and the applicable collective bargaining agreement, not in violation thereof, the contractor will take the initiative in seeking out for prospective employment on the construction site of the project craftspeople who are members of minority groups.

f. To the extent permitted by law and the applicable collective bargaining agreement, not in violation thereof, wherever possible and consistent with the actual requirements of the work to be done, the Contractor will establish entry-level positions, (e.g., mechanic's helper, electrician's helper, laborer's helper, etc.) in which skills may be taught in preparation for, or as an adjunct or alternative to, formal apprenticeship.

g. The Contractor will review their respective collective bargaining agreements in order to indemnify, and discontinue when possible, provisions which tend to limit recruitment or hiring members of minority groups.

h. To the extent permitted by law and the applicable collective bargaining agreement, not in violation thereof, the Contractor will make the fullest possible use of their rights of selection to further the employment of members of minority groups.

i. The Contractor will include the provisions of paragraphs (a) through (h) of this Section in every subcontract or purchase order in such a manner that such provisions will be binding upon each subcontractor or vendor as to operations to be performed within the State of New York. The Contractor will take such action in enforcing such provisions of such subcontract or purchase order as the Owner may direct, including sanctions or remedies for non-compliance.

4. PREVENTION OF DUST HAZARD:

The parties hereto, in accordance with the provision of Section 222-a of the Labor Law, hereby agree as follows:

a. In the construction of public works wherein a harmful dust hazard is created for which appliances or methods for the elimination of harmful dust have been approved by the board of standards and appeals, the installation, maintenance and effective operation of such appliances and methods will be complied with by the Contractor. Failure to do so shall void this contract.

5. EIGHT HOUR DAY:

The parties hereto, in accordance with provisions of Section 220 Subdivision 2 of the Labor Law of the State of New York hereby agree as follows:

a. That no contractor, subcontractor, nor any person on their behalf shall permit or require any laborer, worker, or mechanic to work more than eight hours in any one calendar day, or more than five days in any week except in the case of extraordinary emergency, including fire, flood, or danger to life or property that are outlined in Section 220, subparagraph 2 of the Labor Law, and then only with the special dispensation of the Industrial Commissioner as required by said Section.

6. PREVAILING WAGE RATES REQUIRED BY LAW:

a. The parties hereto, in accordance with the provisions of Section 220 (3) of the Labor Law, hereby agree that there shall be paid each employee engaged in work under this contract not less than the wage rate and supplements set opposite the trade or occupation in which they are engaged, as listed on Schedule "A" attached hereto and made a part of this agreement, which are the wage rates and supplements established as the prevailing rate of wages for the work covered by this contract.

b. Labor classifications not appearing on the schedule of wages can be used only with the consent of the Owner and then the rate to be paid will be given by the Owner after being advised by the Department of Labor.

c. The Contractor shall post in a prominent and accessible place on the site of the work a legible statement in the contract, for the various classes of mechanics, workers, or laborers employed on the work.

7. REQUIRED PROVISIONS OF LAW:

a. Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to have been inserted herein, and if through mistake or otherwise, such provision is not inserted, then upon the application of either party, this contract shall be physically amended forthwith to make such insertion.

b. Each Contractor and subcontractor is hereby notified that all occupations employed directly on the site of the work of this contract shall be paid hourly wage rates not less than that determined by the Industrial Commission of the New York State Department of Labor in accordance with the applicable provision of the "Labor Law". A current Prevailing Rate Schedule, as prepared by the Department of Labor of the State of New York is attached to and made a part of these specifications.

c. Notices of Compliance with Worker's Compensation Law and Disability Benefits Law, as amended, shall be displayed in a prominent place.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Telephone Service.

B. Temporary water service.

C. Temporary sanitary facilities.

D. Water control.

E. Exterior enclosures.

F. Interior enclosures.

G. Protection of installed work.

H. Maintenance of traffic.

I. Parking.

J. Project identification.

K. Field offices and sheds.

L. Scaffolds, staging, and safety devices.

M. Lifting devices and hoisting facilities.

N. Removal of utilities, facilities, and controls.

1.2 RELATED SECTIONS

A. Section 01 50 13 - Safety Standards: Construction contaminants, construction noise, fencing, barriers, security, fire and hazard protection, progress cleaning, and ventilation during construction. .

B. Section 01 50 23 – Uniform Safety Standards for School Construction: Building occupancy, general safety and security standards, separation of construction, exiting plan, ventilation plan, construction noise, construction contaminants, asbestos abatement, and presence of lead.

C. Section 01 51 00 – Temporary Utilities: Electricity, lighting, heat, and ventilation.

1.3 TEMPORARY ELECTRICITY

A. Refer to Section 01 51 00 – Temporary Utilities.

1.4 TEMPORARY LIGHTING

A. Refer to Section 01 51 00 – Temporary Utilities.

1.5 TEMPORARY HEAT

A. Refer to Section 01 51 00 – Temporary Utilities.

1.6 TEMPORARY VENTILATION

A. Refer to Section 01 50 23 – Uniform Safety Standards for School Construction and Section 01 51 00 – Temporary Utilities.

1.7 TELEPHONE SERVICE

A. Each prime Contractor will provide cell phone access at all time of on site construction.

1.8 TEMPORARY WATER SERVICE

A. Each Prime Contractor shall connect to existing water source for construction operations.

B. Owner will pay cost of water used. Exercise measures to conserve water.

C. Each Prime Contractor requiring water shall provide their own hoses and connections as needed. Damage to hose bibbs or other portions of the water system shall be repaired by the contractor causing the damage.

D. All contractors shall cooperate in conserving water.

1.9 TEMPORARY SANITARY FACILITIES

A. Contract No. 4 - Plumbing Construction Contractor shall provide a minimum of (1) temporary toilet per active construction area. Temporary toilets to be maintained and cleaned weekly. Additional temporary toilets may be required to meet DOH minimum standards. Plumbing Contractor will also be responsible for weekly pumping and maintaining of holding tank at temporary construction trailer located at Bus Garage. The toilets shall be decently screened from public observation. Provide within fifteen (15) days of Notice to Proceed.

B. Existing facilities shall not be used.

C. Each contractor shall cooperate in keeping the toilets in a sanitary condition.

D. On completion of the work, the Contract No. 4 – Plumbing Construction Contractor shall remove the temporary toilets and all traces thereof.

E. Temporary Trailer shall be provided by Contract No. 1 – General Construction Contractor at Bus Garage Transportation Department.

1. Duration: 6 Months

2. Specifications: 10'x 40' office trailer with toilet facility similar or equal to Cassone Office Trailer Mobile Unit CA 10' X 40'. Office trailer shall be well-insulated and winterized to allow for use during winter months. Trailer to be submitted to Construction Manager for approval prior to order.

3. Contract No. 3 – Electrical Construction Contractor shall be responsible for providing power and disconnection of power to office trailer.

4. Contract No. 4 – Plumbing Construction Contractor shall be responsible for holding tank, domestic water and sewer connections. Plumbing Construction Contractor shall have holding tank pumped once per week. Upon completion of the work, Plumbing Contractor shall be responsible for disconnection of holding tank, domestic water and sewer connections.

1.10 WATER CONTROL

A. Each Prime Contractor shall grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Each Prime Contractor shall protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.11 EXTERIOR ENCLOSURES

A. Contract No. 1 - General Construction Contractor to provide temporary insulated weather-tight closure of exterior openings to provide acceptable working conditions and protection for materials, to allow for temporary heating, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

B. Each Prime Contractor shall be responsible to maintain safe access to and egress from the existing buildings and new construction at all times to meet requirements of New York State Uniform Fire Prevention and Building Code, OSHA, and New York State Education Department regulations.

1.12 INTERIOR ENCLOSURES

A. Contract No. 1 - General Construction Contractor shall provide temporary partitions as required to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.

B. Construction: 3-5/8" steel stud framing with 5/8" fire-rated gypsum board sheet materials both sides, with closed joints and sealed edges at intersections with existing surfaces.

1.13 PROTECTION OF INSTALLED WORK

A. Each Prime Contractor shall protect installed Work and provide special protection where specified in individual specification Sections.

B. Each Prime Contractor shall provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

C. Each Prime Contractor shall provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Each Prime Contractor shall protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Each Prime Contractor shall prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Each Prime Contractor shall prohibit traffic from landscaped areas.

1.14 MAINTENANCE OF TRAFFIC

A. Contract No. 1 - General Construction Contractor shall maintain roadways, sidewalks, and crosswalks to such an extent as will give safe, unimpeded, practical use. The work shall be conducted so as to cause a minimum of inconvenience to public travel and to permit safe and convenient access to building and parking areas along the line of work. All fire hydrants, fire alarm boxes, water valves, manholes and catch basins shall be kept accessible for use.

B. Contract No. 1 - General Construction Contractor shall provide and maintain all necessary flag persons, barricades, warning lights and signs, and take all necessary precautions for the protection and safety of the public, the workers and the work. Existing warning signs and devices for public safety shall not be disturbed or obstructed without permission from the responsible authority and an approved substitution made. Properly equipped and protected flag persons shall be provided whenever traffic is restricted, or equipment is being operated within the traveled way. Warning signs shall be placed at a reasonable stopping distance both sides of the work. All barricades and signs left in place at night shall be illuminated with flares or blinking lights maintained in operating condition.

C. Contract No. 1 - General Construction Contractor shall maintain vehicular and pedestrian traffic on all roadways unless otherwise authorized by the Owner. In general, one-way traffic shall be maintained at all times. Access to parking areas shall be maintained at all times. Advance notice shall be given to the Owner whenever the use of roadways or parking areas will be restricted.

D. Contract No. 1 - General Construction Contractor shall control any dust caused by their operations by sweeping, flushing, wetting or the use of chemicals, as often as necessary to prevent inconvenience or nuisance.

E. Where a detour is permitted, Contract No. 1 - General Construction Contractor shall be responsible for establishing, maintaining, and eliminating the detour to the satisfaction of the Owner.

F. Contract No. 1 - General Construction Contractor shall provide means of removing mud from vehicle wheels before entering streets.

1.15 PARKING

A. Each Prime Contractor shall make such arrangements with the Owner as required for parking of equipment and employees necessary for construction work.

B. When site space is not adequate, provide additional off-site parking.

C. Each Prime Contractor shall not allow vehicle parking on existing pavement unless authorized by Owner.

1.16 PROJECT IDENTIFICATION

A. Allow no signs or advertising of any kind on the job site, except as specifically approved in advance by the Construction Manager.

1.17 FIELD OFFICES AND SHEDS

A. Each Prime Contractor shall provide and maintain such office, storage sheds, and other temporary buildings or trailers on the project site as required for their own use. The location of the sheds and trailers shall be approved by the Owner and the Construction Manager. Remove sheds and trailers when work is completed or as directed.

B. Storage Sheds for Tools, Materials, and Equipment: Weather-tight, with heat and ventilation for Products requiring controlled conditions, with adequate space for organized storage and access, and lighting for inspection of stored materials.

1.18 SCAFFOLDS, STAGING, AND SAFETY DEVICES

A. Each Prime Contractor shall provide, erect, maintain and remove all scaffolding, staging, platforms, temporary runways, temporary flooring, guards, railings, stairs, etc., as required for their work and the protection of workers and the public. Construction inspection and maintenance of the above items shall comply with all safety codes and regulations as applicable to the Project.

1.19 LIFTING DEVICES AND HOISTING FACILITIES

A. Each Prime Contractor shall provide cranes, hoists, towers and other lifting devices necessary for proper and efficient movement of materials; provide operating personnel for equipment as required. Equipment shall be provided with proper guys, bracing, and other safety devices as required by local and state codes. Remove towers and hoisting equipment when they are no longer needed.

1.20 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 50 13

SAFETY STANDARDS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Owner Occupancy.

B. Fencing.

C. Barriers.

D. Security.

E. Fire and Hazard Protection.

F. Progress Cleaning.

G. Ventilation During Construction.

H. Materials Containing Asbestos.

I. Materials Containing Lead-Based Paint.

J. Mold and Mildew.

1.2 OWNER OCCUPANCY

A. All contractors shall construct work to accommodate Owner's occupancy requirements during the construction period. Coordinate construction schedules and operations with Owner, Construction Manager, and Architect at the Pre-Construction Meeting and adjust for subsequent job meetings.

B. Owner will occupy premises during entire period of construction for the conduct of their normal operations. Each Contractor shall cooperate with the Owner to minimize conflict, and to facilitate Owner's operations.

C. Schedule the work and coordinate operations to accommodate this requirement.

D. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a Certificate of Occupancy.

1.3 FENCING

A. Construction: Chain link, as approved by Construction Manager.

B. Contract No. 1 – General Construction Contractor shall provide six (6) foot high fence, where designated by Construction Manager, around construction site; equip with vehicular and pedestrian gates. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.

C. Each Prime Contractor shall provide fences around construction supplies or debris as required. Fences shall be maintained at all times.

1.4 BARRIERS

A. Contract No. 1 – General Construction Contractor shall provide barriers to prevent unauthorized entry to construction area, to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Contract No. 1 – General Construction Contractor shall provide barricades and covered walkways required by governing authorities for public rights-of-way. 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.

C. Contract No. 1 – General Construction Contractor shall provide separation of construction areas from occupied spaces as designated by Construction Manager. Construction areas under control of the contractor and not occupied by Owner shall be separated from occupied areas. Prevent passage of dust and contaminants into occupied parts of the building. Provide periodic inspection and repair of the containment barriers to prevent exposure to dust or contaminants. Metal stud and gypsum board partitions, conforming to required fire rating, shall be provided in areas of exit ways or other areas requiring fire separation. Heavy-duty plastic sheeting may be used only for vapor, fine dust, or air infiltration barrier, and shall not be used to separate occupied areas from construction areas.

D. Each Prime Contractor shall provide protection for plant life designated to remain. Replace damaged plant life.

E. Each Prime Contractor shall protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.5 SECURITY

A. Each Prime Contractor shall provide security and facilities to protect Work, and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Construction workers shall not use corridors, stairs or elevators designated for students or school staff. Specific stairwells and/or elevators shall be designated for use by construction workers during Owner occupied hours.

C. Entry Control:

1. Restrict entrance of persons and vehicles into Project site and existing facilities.

2. Allow entrance only to authorized persons with proper identification.

3. Maintain log of workers and visitors; make available to Owner and Construction Manager upon request.

D. Personnel Identification:

1. All workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at occupied sites.

2. Provide identification badge to each person authorized to enter premises.

3. Badge to Include: Personal photograph, name, expiration date, and employer.

4. Maintain list of accredited persons, submit copy to Owner and Construction Manager on request.

5. Require return of badges at expiration of their employment on the Work.

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

1.6 FIRE AND HAZARD PREVENTION

A. No smoking is allowed on public school property, including construction areas.

B. Each Prime Contractor shall cooperate with Owner to perform daily inspection of Owner-occupied areas of project to assure that construction materials, equipment, or debris do not block fire exits or emergency egress windows.

C. Each Prime Contractor shall cooperate with Owner to maintain proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems throughout the project.

D. Any holes in floors or walls should be sealed with a fire-resistant material.

1.7 PROGRESS CLEANING

A. Each Prime Contractor shall maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Each Prime Contractor shall remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Each Prime Contractor shall broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.

D. Each Prime Contractor shall remove debris by using enclosed chutes or similar sealed systems. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

E. Each Prime Contractor shall not move debris through corridors of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.

F. Each Prime Contractor shall clean all occupied parts of the building affected by their renovation activity at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.

G. Each Prime Contractor shall remove waste materials, debris, and rubbish from site weekly and dispose off-site. Do not allow any materials, debris, and rubbish to go onto adjacent properties.

1.8 VENTILATION DURING CONSTRUCTION

A. The Contract No. 2 – Mechanical Construction Contractor shall provide indoor air quality management, when the building is enclosed, as determined by the Construction Manager.

B. Work on construction and maintenance time for off-gassing of volatile organic compounds introduced during construction shall be planned before occupancy is allowed. Specific attention is warranted for activities including glues, paint, furniture, carpeting, wall coverings, and drapery. Manufacturers shall be contacted to obtain information regarding appropriate temperatures and times needed to cure or ventilate the product during use and before safe occupancy of a space can be assured. Building materials or furnishings which off-gas chemical fumes, gases, or other contaminants shall be aired out in a well ventilated heated warehouse before it is brought to the project for installation or the manufacturer's recommended off-gassing periods must be scheduled between installation and use of the space. If the work will generate toxic gases that cannot be contained in an isolated area, the work must be done when school classes and programs are not in session. The building must be properly ventilated. and the material must be given proper time to cure or off-gas before re-occupancy.

C. Provide exhaust air systems for any project indoor areas that could produce fumes, VOC's, off-gassing, dusts, mists, or other emissions.

1. Work area exhaust systems shall terminate at the building exterior.

2. Provide temporary air seals and partitions to prevent the migration of airborne contaminants from Work areas to occupied areas.

3. Provide rerouting, disconnection, or capping of ductwork in order to prevent contaminants from the construction area from entering the occupied portions of the building.

4. Existing ventilation equipment may be utilized when authorized by Construction Manager.

5. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations and building occupants, and to prevent contaminants from the construction area from entering the building.

D. Ventilation and heating systems to occupied spaces shall remain operational at all times during construction.

E. Units serving occupied areas may not be disabled.

F. Quality Assurance:

1. Maintain negative pressure between the Work areas and the spaces surrounding the Work areas.

2. Before start of Work, submit a design for the exhaust air system to Construction Manager. Do not begin Work until approval of the Owner and Construction Manager is obtained. Provide the following information:
   a. The number of machines required.
   b. Location of the machines in the Work areas.
   c. Description of the methods used to test airflow and pressure differential.

G. System Operation:

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

1.9 MATERIALS CONTAINING ASBESTOS

A. All contractors are advised that materials containing asbestos will not be accepted for use on this project. Contractor shall provide a letter certifying compliance with this requirement.

B. If the Contractor or subcontractors and their employees locate a material of suspicious nature, the Contractor shall notify the Owner prior to disturbing said material in any fashion. Testing of said material will be by Owner. If found to contain asbestos, material will be removed by approved asbestos handlers using approved methods, following all State and Federal regulations. Additional cost will be by Owner.

1. If asbestos is discovered, abatement shall conform to NYSDOL Industrial Code Rule 56 and AHERA regulations.

2. Whenever air clearance is required for an asbestos abatement project, TEM air clearance shall be provided.

C. The presence of asbestos has been detected in identified work areas. A Summary Analysis Report, including confirmed positives (>1.0%) is included in Document 00 31 00.

D. All contractors are advised that materials containing asbestos in existing buildings may be located in areas of work.

E. All contractors shall exercise caution when working in areas containing asbestos materials. Such materials include, but are not limited to:

1. Thermal system insulation in concealed spaces, wall spaces, pipe chases.

2. Floor tile/mastic.

1.10 MATERIALS CONTAINING LEAD-BASED PAINT

A. All contractors are advised that materials containing lead-based paint will not be accepted for use on this project. Contractors shall provide a letter certifying compliance with this requirement.

B. Lead Based Paint Hazard: All structural steel, unless specifically stated otherwise, is assumed to be painted with lead-based paint or primer. Whenever cutting, torching, welding, grinding or heating structural steel is specified the contractor is responsible for compliance related to lead-based paint in accordance with OSHA Instruction TED 01-00-015 [TED 1-0.15A] (Section V: Chapter 3) provides technical guidance for Controlling Lead Exposures in the Construction Industry: Engineering and Work Place Controls. OSHA also provides instruction by Directive Number STD-03-08-001 titled Welding, Cutting or Heating of Metals Coated with Lead-Bearing Paint.

C. In areas outside of the work area or in concealed spaces that have not been tested for the presence of lead-based paint, if the Contractor or subcontractors and their employees locate a material of suspicious nature, the Contractor shall notify the Owner prior to disturbing said material in any fashion. Testing of said material will be by Owner. If found to contain lead-based paint, material will be removed by approved lead-based paint handlers using approved methods, following all State and Federal regulations. Additional cost will be by Owner.

1. The disturbance or dislocation of lead-based painted materials may cause lead dust to be released into the building's atmosphere, thereby creating a potential health hazard to workers, and building occupants. Apprise all workers, supervisory personnel, subcontractors, and consultants who will be at the job site of the seriousness of the hazard and of proper work procedures which must be followed.

2. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified lead-based paint, take appropriate continuous measures as necessary to protect all building occupants from the potential hazard of exposure to lead dust. Such measures shall include the procedures and methods described herein, and compliance with regulations and guidelines of applicable federal, state and local agencies.

D. The presence of lead has been detected in identified work areas. A Summary Analysis Report, including confirmed positives (greater than or equal to 1.0 mg/cm^2) is attached at the end of this section. A copy of a lead survey report with respect to project work areas is available for viewing at the office of Arcadis, 59-61 Court Street, Suite 300, Binghamton, NY 13901.

E. All contractors are advised that materials containing lead in existing buildings may be located in areas of work.

F. All contractors shall exercise caution when working in areas containing lead materials. Such materials include, but are not limited to:

1. Structural steel.

2. Glazed ceramic wall tile.

1.11 MOLD AND MILDEW

A. The disturbance or dislocation of mold and mildew may cause mold spores to be released into the building's atmosphere, thereby creating a potential health hazard to workers. and building occupants. Apprise all workers, supervisory personnel, subcontractors. and consultants who will be at the job site of the seriousness of the hazard and of proper work procedures which must be followed.

B. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified mold and mildew, take appropriate continuous measures as necessary to protect all building occupants from the potential hazard of exposure to lead dust. Such measures shall include the procedures and methods described herein, and compliance with regulations and guidelines of applicable federal, state, and local agencies.

C. If the Contractor or subcontractors and their employees locate a material of suspicious nature, the Contractor shall notify the Owner prior to disturbing said material in any fashion. Testing of said material will be by Owner. If found to contain hazardous mold and mildew, material will be removed by approved handlers using approved methods, following all State and Federal regulations. Additional cost will be by Owner.

D. All contractors are advised that materials containing mold and mildew in existing buildings may be located in areas of work.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 50 23

UNIFORM SAFETY STANDARDS FOR SCHOOL CONSTRUCTION

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Building Occupancy.

B. Lead and Asbestos Testing.

C. General Safety and Security Standards.

D. Separation of Construction.

E. Exiting Plan.

F. Ventilation Plan.

G. Construction Noise.

H. Construction Contaminants.

I. Asbestos Abatement.

J. Presence of Lead.

K. Safety Data Sheets.

1.2 REFERENCE STANDARD

A. Commissioner's Regulations, Part 155.5.

1.3 BUILDING OCCUPANCY

A. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy. Refer to Section 01 50 13 for additional information.

1.4 LEAD AND ASBESTOS TESTING

A. All school areas to be disturbed during renovation or demolition have been tested for lead and asbestos.

1.5 GENERAL SAFETY AND SECURITY STANDARDS

A. General safety and security standards for construction projects:

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

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

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

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

5. Workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at occupied sites.

6. Refer to Section 01 50 13 for additional information.

1.6 SEPARATION OF CONSTRUCTION

A. Separation of construction areas from occupied spaces:

1. Construction areas which are under the control of a contractor and therefore not occupied by district staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.
   a. A specific stairwell and/or elevator shall be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs or elevators designated for students or school staff.
   b. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
   c. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.

B. Refer to Section 01 50 13 for additional information.

1.7 EXITING PLAN

A. Each Prime Contractor shall provide a plan detailing how exiting required by the applicable building code will be maintained.

1.8 VENTILATION PLAN

A. Each Prime Contractor shall provide a plan detailing how adequate ventilation will be maintained during construction. Refer to Sections 01 50 13 and 01 51 00 for additional information.

1.9 CONSTRUCTION NOISE

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

1.10 CONSTRUCTION CONTAMINANTS

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

B. Each Prime Contractor shall be responsible to ensure that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc. are scheduled, cured or ventilated in accordance with manufacturers recommendations before a space can be occupied.

1.11 ASBESTOS ABATEMENT

A. Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed while the building is occupied.

1. The term "building", as referenced in this section, means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non-combustible construction. The isolated 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.

2. 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.

1.12 PRESENCE OF LEAD

A. 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, work site preparation, work methods, cleaning and clearance testing which are in general accordance with the HUD Guidelines.

1.13 SAFETY DATA SHEETS

A. Manufacturer's safety data sheets (SDS) shall be maintained at the site for all products used in the project. SDS must be provided to anyone who requests them. SDS indicates chemicals used in the product, product toxicity, typical side effects of exposure to the product and safe procedures for use of the product.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 51 00

TEMPORARY UTILITIES

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity and lighting.

1.2 TEMPORARY ELECTRICITY

A. The existing power system shall be made available for the beneficial use of all prime contract work. The use of the permanent system shall be contingent on the inspection and approval by the Architect/Engineer.

1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Cost: By Contract No. 3 - Electrical Construction Contractor; provide and pay for temporary lighting required. Cost of temporary lighting shall be included in the Base Bid.

B. The Contract No. 3 – Electrical Construction Contractor shall provide and maintain lighting for all construction operations to achieve a minimum lighting level of 2 watt/sq ft.

C. The Contract No. 3 – Electrical Construction Contractor shall provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

D. The Contract No. 3 – Electrical Construction Contractor shall maintain lighting and provide routine repairs.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 56 39

TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Marking of clearing limits.

B. Marking individual trees to be protected.

C. Marking groups of trees and shrubs to be protects

D. Tree protection fencing

E. Maintenance of trees as defined in this Section.

1.02 RELATED REQUIREMENTS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Section 01 57 13 Temporary Erosion and Sedimentation Control.

2. Section 31 20 00 Site Preparation

3. Section 31 13 16 Tree Pruning

1.03 SUMMARY

A. The General Contractor shall install and manage all tree protection during the course of performing his project responsibilities.

B. Tree protection is multilayered and sequential. When, during the course of construction, the Contractor determines the location of tree protection devices needs to be adjusted, the relocation effort shall be supervised and approved by the Certified Arborist. Do no adjustment of tree protection without approval by the Certified Arborist.

C. The General Contractor shall remove all tree protection at the end of the construction contract.

1.04 REFERENCES

A. The following standards shall apply to the work of this Section.

1. International Society of Arboriculture, Savoy, IL 61874 (ISA): Guide for Plant Appraisal

1.05 SUBMITTALS

A. Certifications: Submit appropriate evidence of certification of all arborists to be employed on the Project.

B. At least 30-days prior to ordering materials, the Contractor shall submit representative samples, certifications, manufacturer's product data and certified test results for materials to the Owner's Representative as specified below. No materials shall be ordered or delivered until the required submittals have been reviewed and approved by the Owner's Representative. Delivered materials shall closely match the approved samples. Approval shall not constitute final acceptance. The Owner reserves the right to reject, on or after delivery, any material that does not meet these Specifications.

1. Tree protection fencing: Product literature

1.06 QUALITY ASSURANCE

A. Work of evaluation, pruning, root pruning, fertilizing, and similar activities shall be undertaken only by certified Arborists and chemical applicators, as pertinent to the work being performed.

1. Application of chemicals shall be performed by licensed chemical applicators.

2. Arborist shall be a professional Certified Arborist with a minimum five (5) years of experience.

1.07 LIABILITY FOR DAMAGES

A. The Contractor shall be liable for all damage and/or disturbance to existing trees not otherwise designated for removal. Actual charges for damage to plants shall be in accordance with the schedules defined herein, with assessed charges to be deducted from sums payable under the Construction Contract.

1. Damage that, in the Owner's opinion, can be remedied by corrective maintenance shall be repaired immediately.

2. At the Owner's discretion, the Contractor shall replace trees that are damaged irreparably with new trees of size and type determined by the Owner.

3. In the event that replacement of damaged trees is not feasible or impractical as determined by the Certified Arborist, the estimated value of the trees will be determined by the Certified Arborist using the Trunk formula Method published by the Council of Tree and Landscape Appraisers in The Guide for Plant Appraisal, 9th Edition as modified below:

4. The following data fields are used in the formula:

Estimated Value	Size, species factor, condition factor, and location value
Size	Based on tree DBH (4.5-feet above grade)
Species Factor	Relative species desirability based on 100% for the tree in that geographical location. In most cases, species desirability ratings, published by the International Society of Arboriculture, are used for adjustment.
Condition Factor	Rating of the tree's structure and health based on 100%
Location Factor	Average rating for the site and the tree's contribution and placement, based on 100%

5. The Size is based on the DBH measurements taken in the field. DBH is used to establish cross sectional area using πr^2, where DBH is halved to product the R-value (radius value). The diameters and these equations are used to produce a Trunk Area for the tree to provide the Size value in the Estimated Value equation.

6. The Species Factor refers to the desirability of the tree in this region. The desirability used here comes from the International Society of Arboriculture's (ISA) New England Chapter. The New England Chapter publishes a Tree Species Rating Guide, which provides the most common species and the desirability for that species in the New England region on a scale of 0 to 100.

7. The Condition Factor is based on the Condition Rating assigned to the tree in the field by the Certified Arborist. The ratings will be Good, Fair, Poor, and Dead. The factors for each rating shall be: Good = 0.7, Fair = 0.5, Poor = 0.3, and Dead = 0.0.

8. The Location Factor is based on the Location Value which is the field judgment of the Certified Arborist as to how the tree is contributing to the site. The Location Values that the Owner's arborist uses are Excellent, Good, Fair, Poor, and Unacceptable. The factors for each rating shall be: Excellent = 0.9, Good = 0.7, Fair = 0.5, Poor = 0.3, and Unacceptable = 0.1.

9. To arrive at a dollar value ($), additional information will be required. An Average Nursery Price per square inch is used in the calculation to arrive a dollar value. The Average Nursery Price is provided by the local ISA chapter (the New England chapter) in the Tree Species Rating Guide. The value used for the New England chapter is $80.00 per square inch of cross sectional area. This value shall be used for this Contract.

10. The equation for Estimated Value is: Size X Species Factor X Condition Factor X Location Factor X Price/square inch. = Estimate Value

B. Damaged trees that require removal and/or replacement shall be removed according to the Specification requirements for removals, including refilling and repair of ground surface, with such costs to be borne by the Contractor in addition to assessed charges described herein.

C. The Contractor shall be liable for all damage and/or disturbance to existing adjacent lands beyond the Limit of Work. Actual damage to these areas, caused by the Contractor, shall be repaired to the satisfaction of the Owner, at no additional cost to the Owner. Repairs may include pruning or removing damaged vegetation as specified, performed and paid for under the work of Division 31 Section Tree Pruning, replacement of damaged vegetation, restoration of the ground plane to its original condition, and any other work required to restore the area to its original condition as depicted in the site photographs taken at the beginning of construction. The project will not be accepted until all repair work is complete.

1.08 ON-SITE PRECONSTRUCTION CONFERENCE

A. Before the start of any work on the site, preceding the arrival of equipment, materials or vehicles to the site, and prior to the commencement of any clearing on the site, the Contractor shall arrange a preconstruction conference on the site with the Owner, the Certified Arborist and the Owner's Representatives to identify trees and shrubs that are to be protected or removed. Do no clearing without a clear understanding of existing conditions to be preserved. In addition to the responsibilities and penalties described in this Part of the Specification, the Contractor shall be held responsible for any and all clearing, damage or destruction to plant material that results from the Contractor's failure to schedule and attend the preconstruction conference on site. In the event of said clearing, damage or destruction the Contractor will be assessed the full penalties described in this Section.

PART 2 - PRODUCTS

2.01 TREE PROTECTION FENCING

A. In areas of heavy construction traffic and/or other areas where the tree protection fencing may require frequent adjustment, the contractor shall use Portable chain link fencing equal to commonly available rent-a-fence products. Fencing shall consist of panels of chain link fence in new or near-new condition. Fabric shall be uniform, square mesh diagonal pattern measuring approximately 2-inches on its parallel sides. Provide standard 12-foot panel sections, 8-foot height, with vertical and horizontal cross bars. Panels shall be free standing. Provide weights as required to prevent wind-blown failure. Panels shall be connected with approved corrosion resistant wire, ties, or similar attachment system.

B. In areas of limited construction traffic and/or areas where adjustments to the fencing alignment will be limited, the contractor may use high visibility high tensile strength plastic fencing to delineate vegetation to be protected. Fencing shall be a minimum 4-ft in height and secured to metal stakes set at 4-ft intervals.

2.02 MULCH & COMPOST

A. Wood Chip Mulch: Wood chips for mulching plants may be either hardwood or softwood chips as produced by a chipping machine, which meet the specified requirements. No leaves, young green growth, branches, twigs 2-inches or less in diameter, wood shavings, sawdust, stones or extraneous materials shall be included. Chips shall not exceed 2-inches in greatest dimension. Submit samples for the Owner's Representative's approval.

PART 3 - EXECUTION

3.01 PRECONSTRUCTION MEETING - IDENTIFICATION OF TREES TO REMAIN

A. Prior to starting site demolition operations, meet with the Certified Arborist and the Owner's Representative to identify trees to remain and trees to be removed.

B. Provide color coded ribbon to tag the trees to remain (green) and trees to be remove (orange).

C. Tag each tree as directed by the Certified Arborist and the Owner's Representative.

D. Stake out the location of portable fencing for tree protection. Outline these areas with safety orange spray paint.

E. The Contractor shall be responsible for the protection of all existing trees designated to remain for the length of the construction period, including liability for all damages as specified herein. The placement of protection devices additional to those specified shall, however, be at the Contractor's discretion and with no additional cost to the Owner.

3.02 PROTECTION OF EXISTING TREES

A. The Contractor shall not damage existing trees to remain. The Contractor is required to install protection as necessary to assure undamaged plant material and adjacent conditions.

B. Protect trunks, roots and branches of all trees to remain.

C. Tree protection work shall include trunk protection, root zone protection as determined by the Owner's Representative, and all additional protection deemed appropriate by the Owner's Representative.

D. Tree protection shall remain in place and be maintained in working condition by the Contractor until directed for removal by the Owner's Arborist. Remove tree protection devices in accordance with the approved schedule of removal in accordance with the approved tree protection sequencing plan.

E. Damage no plants to remain by burning, by pumping of water, by cutting of live roots or branches, or by any other means. No plants to be saved shall be used for crane stays, guys or other fastenings. Do not park vehicles within the limits of tree protection fencing. Do not store construction materials within tree protection fencing.

F. Adjust the location of tree protection fencing as directed by the Certified Arborist.

G. Work to be performed by the General Contractor: Establish and carry out maintenance program as approved by the Owner for all trees and plants to be saved within the work limits throughout the time of construction. As a minimum, the maintenance program shall include the following:

1. Watering during drought periods.

2. Pruning of all broken, dead, diseased or weak branches as specified, performed and paid for under the work of Division 31 Section Tree Pruning.

3. Removal and disposal of debris generated by maintenance activities.

3.03 TREE CUTTING, PRUNING AND REMOVAL

A. Pruning shall be specified, performed and paid for under the work of Division 31 Section Tree Pruning

B. Tree removal shall be specified, performed and paid for under the work of Division 31 Section Tree Pruning.

END OF SECTION

SECTION 01 57 00

TEMPORARY CONTROLS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water control.

B. Dust control.

C. Erosion and sediment control.

D. Noise control.

E. Pest control.

F. Pollution control.

G. Rodent control.

1.2 WATER CONTROL

A. Contract No. 1 – General Construction Contractor shall grade site to drain.

B. Each Prime Contractor shall maintain excavations free of water. Provide, operate, and maintain pumping equipment as may be required.

C. Contract No. 1 – General Construction Contractor shall protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion in accordance with the Contract Documents.

1.3 DUST CONTROL

A. Each Prime Contractor shall execute Work by methods to minimize raising dust from construction operations.

B. Each Prime Contractor shall provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.4 EROSION AND SEDIMENT CONTROL

A. Contract No. 1 - General Construction Contractor shall plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

B. Contract No. 1 - General Construction Contractor shall minimize amount of bare soil exposed at one time.

C. Contract No. 1 - General Construction Contractor shall provide temporary measures such as berms, dikes, and drains, to prevent water flow.

D. Contract No. 1 - General Construction Contractor shall periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.5 NOISE CONTROL

A. Each Prime Contractor shall provide methods, means, and facilities to minimize noise produced by construction operations.

B. Each Prime Contractor shall take necessary precautions so that construction and maintenance operations do not produce noise in excess of 60dba in occupied spaces.

C. Operations shall be scheduled for times when the building or affected building spaces are not occupied, or appropriate acoustical abatement measures shall be taken.

1.6 PEST CONTROL

A. Each Prime Contractor shall provide methods, means, and facilities to prevent pests and insects from damaging the Work.

1.7 POLLUTION CONTROL

A. Each Prime Contractor shall provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.8 RODENT CONTROL

A. Each Prime Contractor shall provide methods, means, and facilities to prevent rodents from accessing or invading premises.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 57 13

TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

A. Section 31 20 00 - Earthmoving.

B. Section 32 92 19 - Seeding.

1.02 REFERENCE STANDARDS

A. Erosion and Sediment Control Guidelines: Conform to the latest edition of "NEW YORK STANDARDS and SPECIFICATIONS for EROSION and SEDIMENT CONTROL" by NYS Department of Environmental Conservation DOW (i.e., Bluebook). Refer to these guidelines for construction and maintenance of all items (Temporary and Permanent Structural, Vegetative and Biotechnical) included in the Storm Water Pollution and Prevention Plan (SWPPP).

B. Storm Water Management: Conform to the latest edition of "NEW YORK STATE STORMWATER MANAGEMENT DESIGN MANUAL" prepared by Center for Watershed Protection for NYS Department of Environmental Conservation.

1.03 PERFORMANCE REQUIREMENTS

A. A Storm Water Pollution and Prevention Plan (SWPPP) is not required for this project. The contractor shall still be responsible for installing and maintaining the temporary storm water and diversion control items as shown on the drawings before starting any grading or excavation and maintain compliance of all Storm Water Pollution SPDES regulations. Provide any temporary sediment and erosion control measures that may be required within limits of the work, including any staging areas, throughout construction in conformance with the plan, and as directed by the Owner's Representative. Place the permanent control practices required before the removal of the temporary storm water diversion and control items.

B. During construction conduct operations in such a manner as to prevent or reduce to a minimum any damage to any drainage system from pollution by debris, sediment, chemical or other foreign material, or from the manipulation of equipment and/or materials in or near a drainage way flowing directly to a stream. Any water which has been used for wash purposes or other similar operations which become polluted with sewage, silt, cement, concentrated chlorine, oil, fuels, lubricants, bitumens, or other impurities shall not be discharged into any drainage system or water body.

C. In the event of conflict between these specifications and the regulation of other Federal, State, or local jurisdictions, the more restrictive regulations shall apply.

D. The Contractor shall adhere to all requirements of the Storm Water Pollution Prevention Plan as presented on Drawing No(s). C130 & C530. Comply with all applicable NYSDEC regulatory requirements.

E. The Contractor will submit copies of certificates documenting that on-site workers have completed a NYS Department of Environmental Conservation endorsed Erosion & Sediment Control training as required by General Permit GP-0-20-001.

F. Verify that all applicable permits have been obtained prior to beginning earth disturbing activities on site.

1. Owner will obtain permits and pay for securities required by authority having jurisdiction.

2. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.

G. Provide to Owner a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation control work.

1.04 DESCRIPTION

A. The Work shall consist of furnishing, installing, inspecting, maintaining, and removing soil and erosion control measures as shown on the contract documents or as ordered by the Owner's Representative during the life of the contract to provide erosion and sediment control.

B. Temporary structural measures provide erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope or disturbed area subject to erosion. These are used during construction to prevent offsite sedimentation. Temporary structural measures shall include stabilized construction entrance, dust control, sediment traps, silt fence, storm drain inlet protection, or other erosion control devices or methods as required.

C. Permanent structural measures also control protection to a critical area. They are used to convey runoff to a safe outlet. They remain in place and continue to function after completion of construction. Permanent structural measures shall include land grading, rock outlets, and or other erosion control devices or methods as required.

D. Vegetative measures shall include mulching, protecting vegetation, seeding, and topsoiling or other methods as required.

E. Weekly/bi-weekly inspections will be completed by the Owner's Representative. The Contractor shall comply with and correct all deficiencies found as a result of these inspections. At the end of the construction season when soil disturbance activities will be finalized or suspended until the following spring, the frequency of the inspections may be reduced. If soil disturbance is completely suspended and

the site is properly stabilized, a minimum of monthly inspections must be maintained. The stabilization activities must be completed before snow cover or frozen ground. If vegetation is required, seeding, planting and/or sodding must be scheduled to avoid die-off from fall frosts and allow for proper germination/establishment. Weekly inspections must resume no later than March 15.

1.05 DEFINITIONS – VEGETATIVE MATERIALS MEASURES

A. Mulching: Applying coarse plant residue or chips, other suitable materials, to cover the soil surface to provide initial erosion control while seeding is establishing. Includes hay, straw, wood cellulose, fiber mats, flexible growth medium and other materials approved by the Owner's Representative.

B. Protecting Vegetation: The protecting of trees, shrubs, ground cover and other vegetation from damage by construction equipment to preserve existing vegetation determined important for soil erosion control, water quality protection, shade, screenings, buffers, wildlife habitat, wetland protection, and other values.

C. Temporary Seeding: Erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion. Temporary control is achieved by covering all bare ground areas that exist as a result of the construction activities.

D. Permanent Seeding: Grasses established and combined with shrubs to provide perennial vegetative cover on disturbed, denuded, slopes subject to erosion. Provide permanent stabilization to all disturbed areas void of, or having insufficient, cover to prevent erosion and sediment transport.

E. Topsoiling: Spreading of a specified quality and quantity of topsoil materials on graded or constructed subsoil areas to provide acceptable plant cover growing conditions, thereby reducing erosion, reducing irrigation needs, and the need for nitrogen fertilizer application. Placed before permanent seeding is installed.

F. Sodding: Stabilizing disturbed soil areas with a permanent stand of grass with sod and preventing runoff with sediment to downstream areas.

1.06 DEFINITIONS – TEMPORARY STRUCTURAL MEASURES

A. Stabilized Construction Entrance: A stabilized pad of aggregate underlain with geo-textile located at any point where traffic enters or leaves a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area to reduce or eliminate tracking of sediment onto public rights-of-way or streets.

B. Dust Control: Prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and/or traffic safety problems.

C. Silt Fence: A temporary barrier of geo-textile fabric installed on contours across the slope to intercept sediment laden runoff from small drainage areas. The silt fence shall reduce runoff velocity and effect deposition of transported sediment load. Replace after **9-months**.

D. Storm Drain Inlet Protection: A temporary, semi-permeable barrier installed around storm inlets to prevent sediment laden water from entering a storm drainage system.

E. Check Dam: Small barriers or dams constructed of stone bagged sand or gravel, or other durable material across a drainage way. Used to reduce erosion in a drainage channel by restricting the velocity of flow in the channel.

F. Sediment Trap: A temporary sediment control device formed by excavation and/or embankment to intercept sediment laden runoff and retain sediment in order to protect drainage ways, properties, and rights-of-way downstream of the sediment trap from sedimentation.

1.07 DEFINITIONS – PERMANENT STRUCTURAL MEASURES

A. Riprap: A layer of stone designed to protect slopes that are subject to erosion.

B. Rock Outlet Protection: A section of rock protection placed at the outlet end of the culverts, conduits, or channels to reduce the depth, velocity, and energy of water such that the flow will not erode the receiving downstream reach.

C. Grass Lined Waterway: A natural or man-made channel of parabolic or trapezoidal cross-section that is below adjacent ground level and is stabilized by suitable vegetation. Used to convey runoff without causing damage by erosion.

1.08 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Manufacturers cut sheets for erosion control materials; including silt fence (fabric & mesh), stone materials, tree protection fencing, turbidity curtains, and erosion control blankets.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Mulch: Use one of the following:

1. Straw or hay.

2. Wood chips, or bark.

3. Erosion control matting or netting.

B. Seeding: Temporary, see Seeding Section 32 92 19.

C. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:

1. Equivalent Opening Size: 40-80 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.

2. Flow Through Rate: 25 gal/min/sf, minimum, when tested in accordance with ASTM D4491.

3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355 after 500 hours exposure.

4. Grab Tensile Strength: 110 lb-f, minimum, in cross-machine direction; 124 lb-f, minimum, in machine direction; when tested in accordance with ASTM D4632.

5. Elongation at Failure: 20 percent, when tested in accordance with ASTM D4632.

6. Mullen Burst Strength: 300 PSI, when tested in accordance with ASTM D3786.

7. Puncture Strength: 60 lbs, when tested in accordance with ASTM D4833.

8. Minimum Trapezoidal Tear Strength: 50 lb-f, minimum, when tested in accordance with ASTM D4533.

9. Color: Manufacturer's standard, with embedment and fastener lines preprinted.

10. Manufacturers:
    a. Ten Cate Geosynthetics; Mirafi 170N: www.tencate.com.
    b. US Fabrics; US180NW: www.usfabricsinc.com.
    c. Propex Operating Company; Geotex 701: www.geotextile.com
    d. Willacoochee Industrial Fabrics; WINfab 800N: www.winfabusa.com
    e. Substitutions: See Section 01 60 00 - Product Requirements, and as listed on the current NYSDOT List of Approved Materials.

D. Wire Fence for Reinforced Silt Fence: Minimum 14 gage with a maximum 6-in. mesh opening.

E. Silt Fence Posts: One of the following, minimum 3.5-feet long with minimum 18-in embedment:

1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot.

2. Softwood, 4-inch by 4-inch in cross section.

3. Hardwood, 2-inch by 2-inch in cross section.

F. Gravel: See Section 31 20 00 for aggregate.

G. Riprap & Outlet Protection Stone: See Section 31 20 00.

PART 3 - EXECUTION

3.01 WORK AREAS

A. The Owner's Representative has the authority to limit the surface area of erodible earth exposed by earthwork operations and to direct the Contractor to provide immediate temporary or permanent erosion measures to minimize damage to property and contamination of watercourses and water impoundments. Under no circumstances will the area of erodible earth material exposed at one time exceed 40,000 sq. ft., unless a permit has been obtained from the NYSDEC. The Owner's Representative may increase or decrease this area of erodible earth material exposed at one time as determined by his analysis of project, weather and other conditions. The Owner's Representative may limit the area of clearing and grubbing and earthwork operations in progress commensurate with the Contractor's demonstrated capability in protecting erodible earth surfaces with temporary, permanent, vegetative or biotechnical erosion control measures. All limitations shall be at no additional cost to the Owner.

B. Schedule the work so as to minimize the time that earth areas will be exposed to erosive conditions. Provide temporary structural measures immediately to prevent any soil erosion.

C. Provide temporary seeding on disturbed earth or soil stockpiles exposed for more than **7-days** or for any temporary shutdown of construction. See Section 32 92 19 for types and rates. Also, apply hay or straw at a rate of 3 bales/1000 sq. ft. (2 tons per acre) or wood fiber hydromulch at the manufacturer's recommended rate when seeding alone is not sufficient to provide stabilization. Hay or straw shall be anchored.

D. Coordinate the use of permanent controls or finish materials shown with the temporary erosion measures.

E. All erosion and sediment control devices must be maintained in working order until the site is stabilized. All preventative and remedial maintenance work, including clean out, repair, replacement, re-grading, re-seeding, or re-mulching, must be performed immediately.

F. After final stabilization (80% minimum vegetative cover) has been achieved temporary sediment and erosion controls must be removed. Areas disturbed during removal must be stabilized immediately.

3.02 PREPARATION

A. Schedule work so that the minimum amount of soil practical is exposed at any one time.

3.03 SCOPE OF PREVENTIVE MEASURES

A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

B. Stabilized Construction Entrances: Traffic-bearing aggregate surface.

1. Width: As required; 20-feet, minimum.

2. Length: 50-feet, minimum.

3. Provide at each construction entrance from public right-of-way.

4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

C. Linear Sediment Barriers: Silt fences.

1. Provide linear sediment barriers:
   a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
   b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
   c. Along the toe of cut slopes and fill slopes.
   d. Perpendicular to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas; space at maximum of 200-feet apart.
   e. Across the entrances to culverts that receive runoff from disturbed areas.

2. Space sediment barriers with the following maximum slope length upslope from barrier fence:

		Slope Length / Fence Length	
a.	Slope of Less Than 2 Percent:	NA	NA
b.	Slope Between 2 and 10 Percent:	250-feet /	2,000-feet
c.	Slope Between 10 and 20 Percent:	150-feet /	1,000-feet
d.	Slope Between 20 and 33 Percent:	80-feet /	750-feet
e.	Slope Between 30 and 50 Percent:	70-feet /	350-feet
f.	Slope Greater Than 50 Percent:	30-feet /	175-feet

D. Storm Drain Inlet Protection: Protect each inlet using one of the following measures:

1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.

2. Stone and block protection with concrete blocks placed around the inlet and then wrapped with fabric and surrounded with stone.

3. Paved surface inlet protection consisting of sandbags or manufactured surface barriers placed around the inlet in a manner that does not divert flow away from the inlet.

4. Manufactured insert inlet protection shall be installed and anchored in accordance with manufacturer's recommendations and design details.

E. Soil Stockpiles: Protect using one of the following measures:

1. Cover with mulch at least 4-inches thickness of pine needles, sawdust, shredded bark, wood chips, or 6-inches of straw or hay.

2. Apply temporary seed and hydromulch.

F. Mulching: Use only for areas that may be subjected to erosion for less than 6-months.

1. Wood Chips: Use only on slopes 3:1 or flatter; no anchoring required.

G. Temporary Seeding: Use where temporary vegetated cover is required. Includes all disturbed areas that have been inactive for greater than **7-days**.

H. Check Dams: Use in drainage channels where the maximum drainage area does not exceed two (2) acres.

1. Shall not have a height greater than 2-ft. Center shall be maintained 9-in lower than abutments at natural ground elevation.

2. Side slopes shall be 2:1 or flatter.

3. Spacing shall be in accordance with the NYS Bluebook, or as shown on the project plans.

3.04 INSTALLATION

A. Stabilized Construction Entrance and Other Traffic-Bearing Aggregate Surfaces:

1. Excavate minimum of 6-inches.

2. Place geotextile fabric full width and length, with minimum 12-inch overlap at joints.

3. Place and compact at least 6-inches of 1.5 to 3.5-inch diameter stone.

B. Silt Fences:

1. Store and handle fabric in accordance with ASTM D4873.

2. Where slope gradient is less than 3:1 or barriers will be in place less than 6-months, use nominal 16-inch high barriers with minimum 36-inch long posts spaced at 6-feet maximum, with fabric embedded at least 4-inches in ground.

3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6-months, use nominal 28-inch high barriers, minimum 48-inch long posts spaced at 6-feet maximum, with fabric embedded at least 6-inches in ground.

4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20-feet, use nominal 32-inch high barriers with woven wire reinforcement and steel posts spaced at 4-feet maximum, with fabric embedded at least 6-inches in ground.

5. Install with top of fabric at nominal height and embedment as specified.

6. Embed bottom of fabric in a trench on the upslope side of fence, with 2-inches of fabric laid flat on bottom of trench facing upslope; backfill trench and compact.

7. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18-inches, with extra post.

8. Fasten fabric to wood posts using one of the following:
   a. Four nails per post with 3/4 inch diameter flat or button head, 1-inch long, and 14 gage, 0.083 inch shank diameter.
   b. Five staples per post with at least 17 gage, 0.0453 inch wire, 3/4-inch crown width and 1/2-inch long legs.

9. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.

10. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12-inches high with post spacing not more than 4-feet.

C. Inlet Protection:

1. Store and handle fabric in accordance with ASTM D4873.

2. For lawn areas where drainage area is 1-acre or less per structure, use Fabric Drop Inlet Protection practice. Install in accordance with NYS Bluebook guidelines.

3. For paved areas where drainage area is 1-acre or less per structure, use Stone and Block Drop Inlet Protection practice. Install in accordance with NYS Bluebook guidelines.

D. Mulching Over Large Areas:

1. Dry Straw and Hay: Apply 2-1/2 tons per acre; anchor using dull disc harrow or emulsified asphalt applied using same spraying machine at 100 gallons of water per ton of mulch.

2. Erosion Control Matting: Comply with manufacturer's instructions.

E. Mulching Over Small and Medium Areas:

1. Dry Straw and Hay: Apply 4 to 6-inches depth.

2. Erosion Control Matting: Comply with manufacturer's instructions.

F. Temporary Seeding:

1. When hydraulic seeder is used, seedbed preparation is not required.

2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.

3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.

4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.

5. Incorporate fertilizer into soil before seeding.

6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.

7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.

8. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

A. Inspect preventive measures weekly, and within 24-hours after the end of any storm that produces 0.5-inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Silt Fences:

1. Promptly replace fabric that deteriorates unless need for fence has passed.

2. Remove silt deposits that exceed one-third of the height of the fence.

3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Stabilized Construction Entrance:

1. Maintain entrance in a condition which will prevent tracking of sediment onto public rights-of-way or streets.

2. Top dress as needed with additional aggregate.

3. Any sediment tracked onto adjacent streets shall be removed immediately.

E. Clean out temporary sediment control structures weekly and relocate soil on site.

F. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Project Representative.

B. Clean out temporary sediment control structures that are to remain as permanent measures. Dispose of materials in accordance with all appropriate local, state, and federal disposal regulations.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

D. Product options.

E. Product substitution procedures.

1.2 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

B. Comply with Specifications and referenced standards as minimum requirements.

C. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

D. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

E. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions.

B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.

C. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

D. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weather-tight, climate-controlled enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports, above ground.

E. Provide off-site storage and protection when site does not permit on-site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.5 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Submit a request for equivalent for any manufacturer not named in accordance with Document 00 21 00.

1.6 PRODUCT SUBSTITUTION PROCEDURES

A. Document 00 21 13 – Instruction to Bidders specifies time restrictions for submitting requests for equivalents during bidding period.

B. Substitution: A product or system proposed for substitution, after the award of contract, whose components or characteristics differ from the specified criteria for that product or system. If accepted, a substitution may result in a change to the contract amount. Substitutions will only be accepted in the event that products or systems are discontinued.

C. The materials, products and equipment described in the Contract Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.

D. Substitutions will only be considered when a Product becomes unavailable through no fault of the Contractor.

E. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment, or other portions of the work, including changes in the work of other contracts, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect/Engineer's decision of approval or disapproval shall be final.

F. A request constitutes a representation that the Contractor:

1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.

2. Will provide the same warranty for the Substitution as for the specified Product.

3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.

4. Waives claims for additional costs or time extensions which may subsequently become apparent.

5. Will reimburse Owner for review or redesign services associated with re-approval by Architect/ Engineer.

G. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

H. Substitution Submittal Procedure:

1. Submit three (3) copies of request for Substitution for consideration. Limit each request to one proposed Substitution.

2. Submit shop drawings, product data, and certified test results attesting to the proposed Product equivalence. Burden of proof is on proposer.

3. The Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 70 00

EXECUTION REQUIREMENTS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Starting of systems.

D. Demonstration and instruction.

E. Testing, adjusting, and balancing.

F. Protecting installed construction.

G. Project record documents.

H. Operation and maintenance data.

I. Manual for materials and finishes.

J. Manual for equipment and systems.

K. Spare parts and maintenance products.

L. Product warranties and product bonds.

M. Final inspection.

N. Evidence of payments and release of liens.

O. Final application for payment.

P. Final certification for payment.

Q. Asbestos certification.

1.2 CLOSEOUT PROCEDURES

A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion (AIA G734/CMa).

B. When Contractor considers Work has reached final completion, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Construction Manager and Architect/Engineer's review. Equipment and systems shall have been tested in presence of Owner's Representative and are operational.

C. In addition to submittals required by the conditions of the Contract, provide submittals required by governing authorities.

D. Submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.

E. Construction Manager will issue a final Change Order reflecting approved adjustments to Contract Sum not previously made by Change Order.

F. Deliver evidence of compliance with requirements of governing authorities.

G. Deliver Certificate of Insurance for Products and Completed Operations.

H. Owner will occupy all portions of building as specified in Section 01 10 00.

1.3 FINAL CLEANING

A. Contract No. 1 - General Construction Contractor shall execute final cleaning prior to final inspection.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains, and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to surface and material being cleaned.

D. Clean debris from roofs, gutters, downspouts, and drainage systems.

E. Clean site; sweep paved areas; rake clean landscaped surfaces.

F. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 STARTING OF SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems with Construction Manager.

B. Notify Construction Manager seven (7) days prior to start-up of each item.

C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verity tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable manufacturer's representative and Construction Manager in accordance with manufacturers' instructions.

G. When specified in individual specification sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Section 01 30 00 that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.

B. Demonstrate Project equipment and instruct by qualified manufacturer's representative who is knowledgeable about the Project.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.6 TESTING, ADJUSTING AND BALANCING

A. Contract No. 2 – Mechanical Construction Contractor shall employ and pay for services of independent firm to perform testing, adjusting, and balancing.

B. Independent firm will perform services specified in individual specification sections.

C. Reports will be submitted by independent firm to Construction Manager indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

1.8 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other Modifications to the Contract.

5. Reviewed Shop Drawings, Product Data, and Samples.

6. Manufacturer’s instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store Record Documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record at each product section description of actual Products installed, including the following:

1. Manufacturer's name and product model and number.

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and Modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish first floor datum.

2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

4. Field changes of dimension and detail.

5. Details not on original Contract Drawings.

G. As-built Survey Mapping: Upon completion of the installation of all proposed sitework features, the contractor shall provide an as-built topographical survey map prepared by a licensed land surveyor showing all features within the project limits. Surveyed features shall include but not be limited to all installed pavements, curbing, fences, signage, plantings, underground utilities, aboveground utilities, contours depicting the grades constructed, and existing features that abut to the installed features. Mapping shall also include rims and inverts for installed utility structures.

H. Maintenance Log: Contractor shall maintain a log of maintenance activities throughout the construction timeframe that documents weekly rainfall rates, dates of seeding and mulching, dates of watering, dates of mowing, dates of fertilizing, dates of core aeration, and all other lawn maintenance activities required by the contract. Log shall be submitted to the Owner's Representative prior to final inspection of lawn areas. If lawn areas do not meet the minimum 80% rate of vegetative cover, then contractor shall continue maintenance activities and update the maintenance log accordingly.

I. Each Prime Contractor shall furnish two (2) hard copy sets (original plus copy) and one electronic copy of Project Record As-Built Drawings at the completion of the Contract. As-Built Drawings shall include:

1. All differences from Bid Drawings, clearly noted.

2. All Change Order and Addendum differences from Bid Drawings, clearly noted.

J. At Contract closeout, submit documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.

K. Submit documents to Construction Manager with claim for final Application for Payment.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11- inch text pages, three D side ring binders with durable plastic covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Drawings: Provide with reinforced punched binder tab. Bind in with text, fold larger drawings to size of text pages.

E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Construction Manager, Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.

2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
   a. Significant design criteria.
   b. List of equipment.
   c. Parts list for each component.
   d. Operating instructions.
   e. Maintenance instructions for equipment and systems.
   f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:
   a. Shop drawings and product data.
   b. Air and water balance reports.
   c. Certificates.
   d. Originals of warranties and bonds.

F. Provide two (2) sets of hard copies and one electronic copy.

1.10 MANUAL FOR MATERIALS AND FINISHES

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Construction Manager will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy will be reviewed and returned after final inspection, with Construction Manager and Architect/Engineer comments. Revise content of document sets as required prior to final submission.

D. Submit three (3) sets of revised final volumes in final form within 10 days after final inspection.

E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.

F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.

H. Additional Requirements: As specified in individual product specification sections.

I. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Construction Manager will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit one copy of completed volumes fifteen (15) days prior to final inspection. Draft copy will be reviewed and returned after final inspection, with Construction Manager and Architect/Engineer comments. Revise content of document sets as required prior to final submission.

D. Submit three (3) sets of revised final volumes in final form within ten (10) days after final inspection.

E. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

F. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

G. Include color-coded wiring diagrams as installed.

H. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and special operating instructions.

I. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and re-assembly instructions; and alignment, adjusting, balancing, and checking instructions.

J. Include servicing and lubrication schedule and list of lubricants required.

K. Include manufacturer's printed operation and maintenance instructions.

L. Include sequence of operation by controls manufacturer.

M. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

N. Include control diagrams by controls manufacturer as installed.

O. Include Contractor's coordination drawings, with color-coded piping diagrams as installed.

P. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

Q. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

R. Include test and balancing reports as specified in Section 01 40 00.

S. Additional Requirements: As specified in individual product specification sections.

T. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Construction Manager, obtain receipt prior to final payment.

1.13 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include Table of Contents and assemble in three-D side ring binder with durable plastic cover.

F. Submit prior to final Application for Payment.

G. Time of Submittals:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.

2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.14 FINAL INSPECTION

A. Construction Manager and Architect/Engineer will make final inspection within seven days after receipt of certification.

B. Should Construction Manager and Architect/Engineer consider that Work is finally complete in accordance with requirements of Contract Documents, they shall request Contractor to make Project Closeout submittals.

C. Should Construction Manager and Architect/Engineer consider that Work is not finally complete:

1. Construction Manager shall notify Contractor, in writing, stating reasons.

2. Contractor shall take immediate steps to remedy the stated deficiencies and send second written notice to Construction Manager certifying that Work is complete.

3. Construction Manager and Architect/Engineer will re-inspect Work.

1.15 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS (A copy of all of the following documents may be obtained from the Architect's office.)

A. Contractor's Affidavit of Payment of Debts and Claims: AIA G706.

B. Contractor's Affidavit of Release of Liens AIA G706A, with:

1. Consent of Surety to Final Payment: AIA G707.

2. Separate releases of liens for subcontractors, suppliers and others with lien rights against property of Owner, together with list of those parties.

C. Submittals shall be duly executed before delivery to Construction Manager.

D. Attorneys who sign Consent of Surety to Final Payment must file a certified copy of their Power of Attorney to sign Consent with it for final payment.

1.16 FINAL APPLICATION FOR PAYMENT

A. Contractor shall submit final application in accordance with requirements of General and Supplementary Conditions.

1.17 FINAL CERTIFICATION FOR PAYMENT

A. Construction Manager and Architect will issue final certification in accordance with provisions of General Conditions.

B. Should final completion be materially delayed through no fault of Contractor, Architect and Construction Manager may issue a Semi-Final Certification for Payment, in accordance with provisions of General Conditions.

1.18 ASBESTOS CERTIFICATION

A. Contractor shall submit certification that no asbestos- containing materials were used in construction in accordance with specification Section 01 10 00 - Summary.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

Not Used

END OF SECTION

DIVISION 02 – EXISTING CONDITIONS

SECTION 02 82 00

ASBESTOS ABATEMENT

1 PART 1 GENERAL

1.1 EXAMINATION OF SPECIFICATIONS AND SITE OF WORK

A. The Abatement Contractor shall carefully examine the enclosed documents and visit the site of the work. The Abatement Contractor shall fully inform himself prior to preparation of the proposal as to all existing conditions and limitations under which the work is to be performed and shall include in the Bid a sum to cover all costs of all items necessary to perform the work as set forth in these documents. No allowance will be made to the Abatement Contractor because of lack of such examination or knowledge.

1.2 SUBMITTALS

A. The Abatement Contractor shall submit the following documents within ten (10) calendar days after opening of bids, and prior to award of contract:

1. A description of the proposed approach to the project. This should address methodology of abatement, proposed workforce, schedule, access, storage, security, or services and facilities to be provided by the Owner for the project.

2. Verification that the project will be completed within the specified time period.

3. A current NYS Asbestos Abatement Contractor's license.

4. EPA NESHAPS Project Notification.

5. NYSDOL Project Notification.

6. NYSDOL Notification of residential and business occupants.

7. Asbestos Handling Certificates for each worker/ supervisor employed on this project.

8. Proof of OSHA medical surveillance for each worker/supervisor employed on this project.

9. Safety Data Sheets (SDS) for each material used on this project.

10. Copy of state or local license for waste hauler.

11. Name, address, and certification of landfill approved to accept asbestos waste.

B. The following additional submittals shall be required from the Abatement Contractor at the completion of the project.

1. Work area sign-in sheets.

2. Daily logs.

3. OSHA personal air sample results.

4. Waste Shipment Record for friable asbestos waste: Maintain a waste shipment record as required by the NESHAP regulation which indicates chain of custody, waste manifest forms, landfill receipts, waste generator, transporter, and disposal site; and which describes the nature, size, type of container, and form of asbestos waste. Submit within 35 days of departure from building.

5. Waste Shipment Record for non-friable asbestos waste: Trip tickets/weigh scale receipts for any/all non-friable asbestos waste material disposed of as Construction and Demolition debris.

1.3 SCOPE OF WORK

A. The Abatement Contractor shall furnish all components required and supply all labor, materials, tools, equipment, and insurance, necessary to properly complete the work in accordance with the Contract Documents. The scope of work shall include, but not be limited to:

1. The removal, handling and disposal of all asbestos-containing materials identified on the Contract Drawings. Abatement is considered complete when all layers of asbestos-containing materials are removed completely to the satisfaction of the Owner's Representative. The Abatement Contractor is solely responsible for completeness of abatement.
   a. Pipe and Fitting Insulation – All fitting insulation within the Bus Garage is scheduled for removal.
   b. Window Glazing Compound – Window glazing compound at all windows is scheduled for removal.

2. The minimum criteria by which the work shall be completed are defined in these documents.

1.4 CODES AND REGULATIONS

A. The Abatement Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling and disposal, protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Abatement Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Abatement Contractor shall hold the Owner and Owner’s Representative harmless for failure to comply with any applicable work, hauling, disposal, safety,

health, or other regulation on the part of himself, his employees, or his subcontractors.

B. Federal Requirements which govern asbestos abatement work or hauling, and disposal of asbestos waste materials include but are not limited to, the following:

1. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:
   a. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite; Final Rules. Title 29, Part 1910, Section 1001 and Part 1926, Section 58 of the Code of Federal Regulations.
   b. Respiratory Protection.
      Title 29, Part 1910, Section 134 of the Code of Federal Regulations.
   c. Construction Industry
      Title 29, Part 1926 of the Code of Federal Regulations
   d. Access to Employee Exposure and Medical Records
      Title 29, Part 1910, Section 2 of the Code of Federal Regulations
   e. Hazard Communication
      Title 29, Part 1910, Section 1200 of the Code of Federal Regulations
   f. Specifications for Accident Prevention Signs and Tags
      Title 29, Part 1910, Section 145 of the Code of Federal Regulations

2. U.S. Environmental Protection Agency (EPA), including but not limited to:
   a. Asbestos Hazard Emergency Response Act (AHERA) Regulation Asbestos-Containing Materials in Schools Final Rule & Notice Title 40, Part 763, Sub-part E, Appendix C of the Code of Federal Regulations
   b. Training Requirements of (AHERA) Regulation Asbestos containing Materials in Schools Final Rule & Notice Title 40, Part 763, Sub-part E, Appendix C of the Code of Federal Regulations
   c. National Emission Standard for Hazardous Air Pollutants (NESHAPS)
      National Emission Standard for Asbestos Title 40, Part 61, Sub-part A, and Sub-part M (Revised Sub-part B) of the Code of Federal Regulations

3. New York State requirements which govern asbestos abatement work or hauling, and disposal of asbestos waste materials include but are not limited to the following:
   a. New York State Department of Environmental Conservation Regulations - New York State Official Compilation of Codes, Rules and Regulations - 6 NYCRR 360
   b. New York State Department of Environmental Conservation Regulations - New York State Official Compilation of Codes, Rules and Regulations - 6 NYCRR 364
      1) An annual "Industrial Waste Hauler Permit" specifically for asbestos-containing materials is required for transportation of asbestos-containing waste to disposal site.

c. New York State Department of Labor
Asbestos
Industrial Code Rule #56
Title 12, Part 56 of the New York State Official Compilation of Codes, Rules and Regulations - 12 NYCRR 56

d. New York State Department of Labor Public Employees Safety and Health Act
Article 2, Section 27-a of the New York State Labor Law as amended effective August 2, 1985

e. New York State Department of Labor
Asbestos or Products Containing Asbestos: Licensing
Article 30, Sections 900-911 of the New York State Labor Law
Created by Laws of 1986, Chapter 775

f. New York State Department of Health Asbestos Safety Program Requirements title 10, Part 73, Chapter 11 of the New York State Official Compilation of Codes, Rules and Regulations - 10 NYCRR 73

g. School Asbestos Safety Act (SASA)
Article 9A, Sections 530-536 of the New York State Education Law
Created by Laws of 1979, Chapter 501

h. New York State Education Department - 155.5 Uniform Safety Standard for school construction and maintenance. Official compilation of codes, Rules and Regulations of the state of New York, Title 8. Education Department, Chapter II. Regulations of the Commissioner, Subchapter J. Buildings and Transportation Part 155. Educational facilities.

1.5 NOTIFICATIONS

A. The Abatement Contractor shall: Send written notification as required by USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations (40 CFR 61, Subpart M) to the regional Asbestos NESHAPS Contact at least 10 days prior to beginning any work on asbestos-containing materials. Send notification to the following address:

1. Asbestos NESHAPS Contact
Waste Management Division
USEPA
26 Federal Plaza
New York, NY 10007
(212) 264-4479

B. Send written notification as required by New York State Industrial Code Rule 56 ten (10) days state prior to beginning any work on asbestos-containing materials to:

1. State of New York
Department of Labor
Division of Safety and Health
Asbestos Control Bureau
State Office Campus

Building 12 Room 454
Albany, NY 12240

C. Include the following information in the notification sent to the NYSDOL contact:

1. The name, address, and asbestos handling number of the Abatement Contractor.

2. The address and description of the building or area, including size and age.

3. The amount of asbestos material present in square feet and/or linear feet. If applicable; room numbers and other local information where asbestos material is found unless such material is found throughout the entire building or structure.

4. The proposed starting and completion dates for abatement.

5. The procedures and equipment, including ventilation/exhaust systems that will be employed.

6. Post all notices required by applicable federal, state, and local regulations. Maintain one copy of each notice at job site and keep one copy in Abatement Contractor's office.

7. Notify emergency services including fire, ambulance, police or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of entering work area, emergency entry and exit locations, modifications to fire notification or fire fighting equipment, and other information needed by agencies providing emergency services.

8. Post in clean room of Personnel Decontamination Unit telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company. Any individual at the job site may notify emergency service agencies, if necessary, without effect on this Bid or the Bid Sum.

D. The Abatement Contractor shall: Post or otherwise provide for written notification to building occupants ten (10) days prior to the commencement of work on any asbestos project in the building.

1.6 ADMINISTRATIVE, SUPERVISORY AND WORKING PERSONNEL

A. Superintendent: Provide a full-time Superintendent who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the Abatement Contractor's Representative responsible for compliance with all applicable federal, state, and local regulations, particularly those relating to asbestos-containing materials. The Superintendent must have completed a course at an EPA Training Center or equivalent certificate course in

asbestos abatement procedures and have had a minimum of two (2) years on-the-job training in asbestos abatement procedures. The Superintendent is to be a Competent Person as required by OSHA in 29 CFR 1926. The Superintendent is to be accredited as an Asbestos Abatement Supervisor in accordance with the AHERA regulation 40 CFR Part 763, Subpart E, Appendix C and hold a valid Asbestos Abatement Handler's license in accordance with New York State Department of Labor Industrial Code Rule 56.

B. Asbestos Abatement Workers: All workers are to be trained, certified and accredited as required by New York State Department of Labor Industrial Code Rule 56. Submit state licenses of all workers on project prior to the start of work. Train, in accordance with 29 CFR 1926, all workers in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures.

1.7 DAILY LOG

A. The Abatement Contractor Shall: Maintain within the Decontamination Unit a daily log documenting the dates and time of but not limited to, the following items:

1. Meetings; purpose, attendees, brief discussion.

2. Visitations; authorized and unauthorized.

3. Personnel, by name, entering and leaving the work area.

4. Special or unusual events, i.e., barrier breaching, equipment failures, accidents.

5. Air monitoring tests and test results.

6. Documentation of Abatement Contractor's completion of the following:
   a. Inspection of work area preparation prior to start of removal and daily thereafter.
   b. Removal of any sheet plastic barriers
   c. Abatement Contractor's inspections prior to spray back, lockback, encapsulation, enclosure or any other operation that will conceal the condition of asbestos-containing materials or the substrate from which such materials have been removed.
   d. Removal of waste materials from work area.
   e. Decontamination of equipment (list items).
   f. Abatement Contractors final inspection/final air test analysis.

7. Type, quantity, and location of all asbestos-containing materials removed. Quantity shall be indicated per linear foot measurement, per square foot measurement.

8. Provide three (3) copies of this log to the Owner’s Representative at the completion of the project.

1.8 INSPECTION

A. The Contract Documents include bulk sample information, if available, for building materials suspected to contain asbestos. Prior to disturbance of building materials, the Contractor shall compare the bulk sample results to the scope of work and request, in writing, additional bulk samples or clarification of sample results for any questionable results.

B. Prior to commencement of work, the Abatement Contractor shall inspect areas in which work will be performed, and prepare a listing of damage to structure, surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from the work.

1.9 STOP WORK

A. If the Owner or the Owner's Representative presents a written stop work order immediately and automatically stop all work. All work areas shall be sealed and made safe in accordance with ICR 56 and OSHA 1926.1101 regulations. Do not recommence work until authorized in writing by Owner's Representative.

B. The Owner's Representative, Project Monitor, Air Sampling Technician, Environmental Consultant, etc. has authority to stop work. Verbal stop order will be followed-up with written stop order. All work areas shall be sealed and made safe in accordance with ICR 56 and OSHA 1926.1101 regulations. Do not recommence work until authorized in writing by Owner's Representative.

1.10 TESTING LABORATORY SERVICES

A. The Owner's Representative will perform air sampling and analysis in accordance with 12 NYCRR Part 56 (PCM) and AHERA (TEM).

B. Asbestos Hazard Emergency Response Act (AHERA):

1. Conduct clearance air sampling in accordance with NYSED requirements revision 7/12/13. PCM clearance sampling/analysis allowed where NYSDOL small and minor projects are involved. TEM clearance sampling/analysis required on NYSDOL large project size work.

C. The Abatement Contractor shall conduct his own personal air monitoring and laboratory testing to meet OSHA 29 CFR 1926.1101. This air monitoring and laboratory testing shall be provided by the Abatement Contractor at no additional cost to the Owner.

D. Additional testing and analysis required as a result of failing test results during the course of the project or for clearance monitoring shall be the financial responsibility of the Abatement Contractor.

E. The Abatement Contractor shall provide the following GFCI protected electrical equipment for use by the air sampling firm during final clearance sampling:

1. Six (6) extension cords (14-3 AWG minimum) inside each NYS Large Project Work Area.

2. Four (4) extension cords (14-3 AWG minimum) inside each NYS Small Project Work Area.

3. Length of extension cords shall be sized to allow for complete coverage within the work area.

1.11 TEMPORARY FACILITIES

A. Temporary Water Service Connection: All connections to the Owner's hot and cold-water system shall include backflow protection provided by the Abatement Contractor. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall not be allowed.

B. Electrical Service: The Abatement Contractor shall provide a grounded temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period. Install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every area of work. Protect each circuit with a ground fault circuit interrupter (GFCI) of proper size located in the temporary panel. Do not use outlet type GFCI devices. Lockout all existing power to or through the work area. Unless specifically noted otherwise existing power and lighting circuits to the Work Area are not to be used. At the Contractor’s expense, a licensed electrician shall perform all connection and disconnection to the Owner’s electric service.

C. The Abatement Contractor shall provide a portable electrical generator if power is interrupted or becomes unavailable at the asbestos work areas. The generator shall be of sufficient capacity to supply electrical power for all required asbestos abatement needs including but not limited to temporary lighting, shower heater, shower pumps, negative air pressure and air sampling equipment. The generator shall be provided at no additional cost to the owner and be available for use during all phases of asbestos abatement.

1.12 WORKER PROTECTION

A. The Abatement Contractor shall require all workers to adhere to 12 NYCRR Part 56, Subpart 4, Work Area Entry and Exit Procedures and OSHA 1926.1101. Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area and the entire facility.

B. Decontamination Units: The Abatement Contractor shall provide Personnel and Waste Decontamination facilities in accordance with 12 NYCRR Part 56 and OSHA 1926.1101. Require that the Personnel Decontamination Unit be the only means of ingress and egress for the Work Area. Require that all materials exit the Work Area through the Waste Decontamination Unit.

2 PART 2 PRODUCTS

NOT USED

3 PART 3 EXECUTION

3.1 REMOVAL OF ASBESTOS-CONTAINING MATERIALS

A. New York State Department of Labor Industrial Code Rule 56:

1. All asbestos abatement shall be completed in accordance with New York State Department of Labor Industrial Code Rule 56 (12 NYCRR Part 56) and any applicable or site-specific variances granted for this project.

2. Site-specific variances, if any, are attached at the end of this section.

B. NYSDOL Large and Small Projects shall not be performed while the building is occupied.

C. Removal and containerization of asbestos-containing materials shall be completed in strict accordance with the standard protocols established by the NYSDOL ICR 56 and OSHA 1926.1101 including, but not limited to, decontamination and waste removal procedures.

D. Thoroughly wet to satisfaction of Environmental Consultant asbestos-containing materials to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal encapsulant. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for amended water or removal encapsulant to penetrate material thoroughly. If amended water is used, spray material repeatedly during the work process to maintain a continuously wet condition. If a removal encapsulant is used, apply in strict accordance with manufacturer's written instructions. Perforate outer covering of any installation which has been painted and/or jacketed in order to allow penetration of amended water or removal encapsulant or use injection equipment to wet material under the covering. Where necessary, carefully strip away while simultaneously spraying amended water or removal encapsulant on the installation to minimize dispersal of asbestos fibers into the air.

E. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.

F. Remove saturated asbestos-containing material in small sections. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags. Evacuate air from disposal bags with a HEPA filtered vacuum cleaner before sealing. Twist neck of bags, bend over and seal with minimum three wraps of duct tape. Clean outside and move to Waste Decontamination Unit.

G. All systems which may be disturbed in the performance of the work, located either inside or outside of the work area, including but not limited to electrical

system, plumbing system, speaker system, fire alarm system, smoke alarm system, computer system, telecommunications system, clock system, etc. shall be protected from damage. Support systems as necessary to prevent damage during the performance of the work. Any damage to systems during the performance of asbestos abatement is the responsibility of the Abatement Contractor.

H. Work Areas shall be isolated from the surrounding environment in accordance with the regulations of New York State Industrial Code Rule 56, including any applicable or site-specific variance granted for this project.

I. Completely isolate work areas prior to demolition of non-asbestos-containing materials (pipe chases, ceilings, etc.) necessary to access asbestos-containing materials. Work area isolation shall be in accordance with NYSDOL ICR 56 and OSHA 1926.1101 regulations.

J. Work Areas shall be placarded with signs that conform to OSHA and ICR56 standards.

K. Pipe and Fitting Insulation: Demolish pipe chase/ceiling spaces as necessary to completely remove all asbestos-containing insulation located within wall/ceiling areas. Spray with a mist of amended water or removal encapsulant. Allow amended water or removal encapsulant to saturate material to substrate. If a removal encapsulant is used, use in strict accordance with manufacturer's instructions. Cut bands holding preformed pipe insulation, slit jackets at seams, remove and hand-place in a disposal bag. Remove job-molded fitting insulation in chunks and hand place in a disposal bag. Do not drop to floor. Remove any residue on pipe or fitting with stiff bristle nylon hand brush. Remove ACM insulation from all through floor/through wall locations. In locations where pipe fitting insulation is removed from pipe with straight runs insulated with fibrous glass or other non-asbestos-containing fibrous material, remove fibrous material 6" from the point where it contacts the asbestos-containing insulation. Lag all ends of pipe insulation at abatement areas with wettable lag cloth.

1. Glovebag Use: Where glovebag methodology is specified for abatement at normally occupied areas, the glovebag operation shall occur within tent enclosures. All tent enclosures shall be provided with a continuous negative pressure differential.

2. Glovebags shall only be used for section of pipe insulation being removed. Glovebags shall not be moved to another section of insulation for re-use. The pipe insulation diameter work shall not be exceeded one-half the bag working length. Duct tape shall be placed securely around the pipe insulation to for a smooth seal. The Glovebag shall then be secured to the duct tape and sealed airtight.

3. The Glovebag seal shall be subject to and pass a smoke test as follows:
   a. Aspirate the contents of a smoke tube through the water port access of the bag.

b. After twist sealing the access port, the bag shall be squeezed gently and checked for any leakage points which shall be taped airtight.

4. When using a particular brand of Glovebag, the Contractor shall incorporate the manufacturer's instructions into his work procedure.

5. Do not use Glovebag directly on pipe hotter than 130ºF.

6. Insert wetting nozzle in its porthole opening and seal with duct tape. Insert HEPA vacuum nozzle in its pothole and seal with duct tape.

7. Two Person Operation: One-person inserts hand in glove bag sleeves and removes insulation. Second person operates sprayer and vacuum. Cut ends of pipe using bone or a flexible wire saw. Cut insulation along the bottom of the pipe to the two ends. Spray insulation where cut with water; gently remove insulation; and place in bottom of bag.

8. Wash pipe with water and rub clean. Wet down top of the bag and pipe ends and dampen insulation at the bottom of bag. When bag has reached capacity or all insulation has been removed from that pipe, place all tools in one gloved hand, pull the hand out, invert and twist hand to create a separate pouch. Cut between the bag and the pouch and place the tool pouch in the next glovebag or into a bucket or water. Remove water wand and turn on HEPA vacuum and collapse bag. Twist bag below tool pouch and seal with duct tape. Place bottom of glovebag into 6-mil disposal bag (labeled).

9. Remove all tape, unzip, and fold bag carefully into disposal bag. Wet, wipe and/or vacuum pipe and immediate area.

L. Removal of ACM Window Caulk, Door Caulk, HVAC Caulk, Expansion Joint Caulk and Window Glazing Compounds: Completely remove all asbestos-containing caulk and window-glazing compound from the areas identified on the Contract Drawings. Window/door caulk removal includes the caulk between the window/door frame and the building. Expansion joint caulk includes the caulk located at expansion joints between building sections. Window glazing compound includes the sealant holding the windowpane in place. Remove brick, block and finishes as necessary to allow access for complete removal of the caulk. Secure and protect openings to building at removed window/door/louver systems with minimum ½" wood sheathing. Coordinate sequence of abatement/protection/reinstallation with other involved trades.

3.2 TRANSPORT AND DISPOSAL

A. The Abatement Contractor shall dispose of all removed materials in accordance with NYS and EPA regulations.

1. All friable asbestos-containing materials must be disposed of as asbestos-containing waste in accordance with NYS and EPA regulations.

2. Non-friable waste may be disposed of as Construction and Demolition debris in accordance with NYS and EPA regulations.

B. Offsite processing including but not limited to removal, handling, disturbance, etc, of friable and/or non-friable asbestos-containing materials is prohibited.

C. Asbestos-containing/contaminated waste may not be recycled.

D. Salvage of building components for scrap or salvage value is permitted only after complete on-site removal of all friable and non-friable asbestos-containing materials.

E. Prior to the start of work, submit to the Owner's Representative a copy of New York State license of waste hauler.

F. Submit three (3) copies of the Abatement Contractor's log including all chain of custody forms, manifests, bills of lading and landfill receipts to the Owner's Representative at the completion of the work. Copies shall be made part of the Abatement Contractor's logbook.

G. HEPA vacuum the exterior surface of plastic disposal bags prior to placing in fiber/metal drums or into additional bags. HEPA vacuum fiber/metal drums prior to loading into the decontamination room.

H. Do not store disposal-bagged material outside of Work Area. Take bags from Work Area directly to a sealed truck lined with 6 mil polyethylene or lockable dumpster lined with 6 mil polyethylene.

I. Asbestos-containing materials which have been removed from the building shall not be stored at the site overnight unless in a locked dumpster or locked truck.

J. Do not transport disposal-bagged materials on open trucks. Label drums with same warning labels as bags. Uncontaminated drums may be reused. Treat drums that have been contaminated as asbestos-containing waste and dispose of in accordance with this specification.

K. Transport and dispose of the asbestos waste following the Environmental Protection Agency Guidelines for the Transport and Disposal of Asbestos Waste (40 CFR 763, Subpart E, Appendix D).

3.3 PROJECT DECONTAMINATION

A. The Work Area shall be cleaned in accordance with NYSDOL ICR 56 and OSHA 1926.1101 and to the satisfaction of the analytical testing laboratory technician.

B. After the area has been cleaned and is determined to be dry, the contractor and the Environmental Consultant shall perform a complete Visual Inspection of the entire Work Area. If any debris, residue, dust or other matter is found the Abatement Contractor shall repeat final cleaning and continue decontamination procedure from that point.

C. If Release Criteria are not met, repeat Final Cleaning and continue Decontamination procedure from that point. The Abatement Contractor will be responsible for the cost incurred by the Owner for additional testing after the Decontamination has been repeated.

3.4 REPAIRS AND FINAL CLEANING

A. Prior to leaving the site and prior to final payment for the work, the Abatement Contractor shall repair all damages made to building structure(s) (except those structures scheduled for demolition) including, but not limited to, nail holes, duct tape marks, etc. from the temporary barrier system. The finishes shall be patched to match the existing colors and textures. All miscellaneous materials generated by the Abatement Contractor's activities shall be removed and properly disposed of as determined by the Owner's Representative.

END OF SECTION

DIVISION 03 – CONCRETE

SECTION 03 31 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes Cast-in-place (CIP) structural concrete, including

1. Concrete Formwork and Formwork Accessories
2. Concrete Mixtures and Admixtures
3. Steel Concrete Reinforcement and Accessories
4. Curing compounds
5. Grout
6. Crack repair and epoxy adhesives
7. Joint fillers and sealants
8. Handling, placing, and constructing

B. Products Installed But Not Furnished Under This Section:

1. Anchor rods, leveling plates, railing sleeves, brackets, and other embedded items of steel, vinyl, plastic, or other materials. Refer to Structural Steel-Section 051200, and Metal Fabrications –Section 055000 or other specification sections where the embedded item is described.
2. Sleeves for pipe, conduit and other items passing through or embedded in concrete. Refer to the specification section where the item is described.

C. Related Sections.

1. Code Required Special Inspections and Procedures – Section 014533
2. Structural Steel – Section 051200

1.02 DEFINITIONS

A. ACI 301, Section 1.2 - Definitions:

1. Add the following definitions:
   a. Cementitious Material: Cementitious materials include cement, ground blast furnace slag and fly ash.
   b. Corrosion Inhibitor Admixture: A liquid admixture, calcium nitrite that inhibits corrosion of concrete-embedded steel in the presence of chloride ions.
   c. Pumped Concrete: Concrete that is conveyed by pumping pressure through rigid pipe or flexible hose.
   d. Water-to-Cementitious Ratio (w/c): An equational value representing quantity in pounds of free moisture available for cement hydration divided by quantity of cementitious materials in pounds per cubic yard concrete.

1.03 REFERENCES

A. Work on this project shall conform to all requirements of ACI 301-05 published by the American Concrete Institute, Farmington Hills, Michigan, except as modified by these Contract Documents.

B. Reference publications

1. ACI 301-05: Specifications for Structural Concrete.

2. ACI 302.1R-04: Guide for Concrete Floor and Slab Construction.

3. ACI 304.2R-96: Placing Concrete by Pumping Methods.

4. ACI 305R-99: Hot Weather Concreting.

5. ACI 306R-88: Cold Weather Concreting (Re-approved 1997).

6. ACI 308.1-98: Standard Specification for Curing Concrete.

7. ACI 318-08 Building Code Requirements for Reinforced Concrete.

8. ASTM C 94/C 94M - 04: Standard Specification for Ready- Mixed Concrete.

9. ASTM C 494/C 494M - 04: Standard Specification for Chemical Admixtures for Concrete.

10. ASTM C 311-77 Standard Methods of Sampling and Testing Fly Ash or Natural Pozzolans For Use As A Mineral Admixture in Portland Cement Concrete.

11. Manual of Standard Practice, MSP-1-01 of the Concrete Reinforcing Steel Institute.

1.04 STANDARDS PRODUCING ORGANIZATIONS

A. Refer to ACI 301-14

1.05 SUBMITTALS

A. Submittals Package: Submit product data for design mix(es) and materials for concrete specified below at the same time as a package.

B. Product Data:

1. Mix Design: Submit proposed concrete design mix(es) together with name and location of batching plant at least 28 days prior to the start of concrete work.
   a. Include test results of proposed concrete proportions based on previous field experience or laboratory trial batches in accordance with ACI 301, Section 4.
   b. Pumped Concrete: Include test results of proposed design mix(es) tested under actual field conditions with the maximum horizontal run and vertical lift required for this project.

2. Portland Cement: Brand and manufacturer's name.

3. Fly Ash: Name and location of source, and DOT test numbers.

4. Air-entraining Admixture: Brand and manufacturer's name.

5. Water-reducing Admixture: Brand and manufacturer's name.

6. High Range Water-reducing Admixture (Superplasticizer): Brand and manufacturer's name.

7. Accelerating Admixture: Brand and manufacturer's name.

8. Aggregates: Name and location of source, and DOT test numbers.

C. Reinforcing Steel

1. Shop Drawings: Placing drawings for bar reinforcement.

2. Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.

1.06 QUALITY ASSURANCE

A. Refer to Section 014533-Special Inspections and Testing, for Concrete Construction inspection and testing to be performed by the Owner's Inspection and Testing Agency.

B. Qualifications of Crew Pumping Concrete: Workers pumping concrete shall have had at least one year of experience pumping concrete.

C. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.

D. Truck mixers for concrete shall be currently approved by the New York State Department of Transportation.

E. Pumping equipment for pumped concrete shall be subject to the approval of the Architect.

F. Fly ash supplier shall be on the New York State Department of Transportation's current "Approved List of Suppliers of Fly Ash".

G. Source Quality Control: The Owner reserves the right to inspect and approve the following items, at his own discretion, either with his own forces or with a designated inspection agency:

1. Batching and mixing facilities and equipment.

2. Sources of materials.

H. Pre-Construction Conference: Attend a Pre-Construction Conference at the job site conducted by the Architect's Representative prior to the start of concrete placement for the purpose of reviewing the requirements and procedures of the Contract Documents.

I. Field Quality Control

1. ACI 301, Section 1.6.4.2 - Testing Services:
   a. Add the following paragraph:
   b. 1.6.4.2.e Strength Tests for Pumped Concrete: Prepare strength test specimens and make strength tests from concrete samples obtained at the truck discharge chute and at the end of the pump delivery line in accordance with paragraph 16.3.4.4.

2. ACI 301, Section 1.6.3.3.
   a. Add the following paragraph:
   b. 1.6.3.3.c Make available to the Owner's Inspections and Testing Agency whatever test samples are required to make tests. Furnish shipping boxes for compression test cylinders.

3. Adjustment to Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to the Owner and as accepted by the Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Architect's Representative before using in the work.

4. Test results will be reported by the Owner's Testing Agency in writing to the Architect's Representative and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

5. Nondestructive Testing: Impact hammer, Windsor probe, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

6. Additional Tests: The Architect shall require additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect's Representative. The Owner's Testing Agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified, including all inspection and Engineering fees when non-conforming work is verified.

1.07 DELIVERY

A. ASTM C 94/C 94M - 04, Article 13.1 - Batch Ticket Information: In addition to the information required by Paragraph 16.1, also include the following:

1. Type and brand, and amount of cement.

2. Weights of fine and coarse aggregates.

3. Class and brand, and amount of fly ash (if any).

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement: ASTM C 150, Type I or II Portland cement.

B. Water: Potable

C. Air-entraining Admixture: ASTM C 260, and on the New York State Department of Transportation's current "Approved List".

D. Water-reducing Admixture: ASTM C 494/C 494M - 04, Type A, and on the New York State Department of Transportation's current "Approved List".

E. High Range Water-reducing Admixture (Superplasticizer): ASTM C 494/C 494M - 04, Type F, and on the New York State Department of Transportation's current "Approved List".

F. Retarding Admixture: ASTM C 494, Type D, Water-reducing and retarding, for use in hot weather concreting, and on the New York State Department of Transportation's current "Approved List".

G. Accelerating Admixture: Non-corrosive admixture, containing no chloride, complying with ASTM C 494, Type C or E, and on the New York State Department of Transportation's current "Approved List".

H. Fly Ash: ASTM C 618, including Table 1 (except for footnote A), Class F except that loss on ignition shall not exceed 4.0 percent.

I. ACI 301, Section 4.2.1.2 - Aggregates:

1. Add the following paragraph:
   a. Fine aggregate for pumped concrete shall meet the requirements of ASTM C 33, except 15 to 30 percent shall pass the No. 50 sieve and 5 to 10 percent shall pass the No. 100 sieve. The fineness modulus of the fine aggregate for pumped concrete shall not vary more than 0.20 from the average value used in proportioning.

2. Add the following paragraph:
   a. Aggregates shall be taken from storage silos or other approved locations that have been tested and approved by the New York State Department of Transportation, unless otherwise approved in writing by the Architect.

J. Moisture-Retaining Cover: Waterproof paper, polyethylene film, or polyethylene-coated burlap complying with ASTM C 171.

K. Joint Fillers and Sealants (Contraction Joints within the building and in the concrete slabs on grade):

1. Elastomeric Polyurethane Joint Sealant
   a. Sikaflex-1cSL by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071
   b. Sonolastic® SL 2 by BASF Building Systems
   c. Eucolastic II, as manufactured by the Euclid Chemical Company, 19218 Redwood Road, Cleveland, OH 44110

L. Reinforcing Steel

1. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.

2. Fabric Reinforcement: ASTM A 185, welded wire fabric, fabricated into flat sheets unless otherwise indicated.

3. Bar Supports; Either of the Following Types:
   a. Galvanized steel or AISI Type 430 stainless steel, and without plastic tips.
   b. Insoluble plastic, with minimum 1,500 psi tensile strength and capable of retaining fabricated shape at temperatures between 5 degrees F and 170 degrees F.
   c. Solid concrete brick

4. Fabric Reinforcement Supports:
   a. Uni Zag by Universal Form Clamp, 840 South 25th Avenue, Bellwood, IL 60104, (800)728-1958.
   b. Continuous Support, "CS" by Dayton Superior, 721 Richard Street, Miamisburg, OH 45342, (800) 745-3700.
   c. Solid concrete brick

5. Tie Wire: Black annealed wire, 16-1/2 gage or heavier.

N. Chemical Curing and Anti-Spalling Compound: ASTM C-309, Type 1D, Class B, with a minimum 18 percent total solids content. No thinning of material allowed.

1. SureCure Emulsion, Kaufman Products, Inc. 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.

2. Cure & Seal by Symons Corp., 200 East Touhy Ave., PO Box 5018, Des Plaines, IL 60017-5018, (847) 298-3200.

3. Kure-N-Seal by Sonneborn/ BASF Building Systems, 889 Valley Park Dr., Shakopee, MN 55379, (800) 433-9517.

4. Day-Chem Cure & Seal UV 26 percent (J-22 UV) by Dayton Superior Corp., 721 Richard St., Miamisburg, OH 45342, (800) 745-3700.

5. Acrylseal HS by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

2.02 PROPORTIONING OF MIXES

A. Normal weight concrete for concrete foundation piers and walls, concrete columns, and for all other concrete unless otherwise specified, shall have a minimum compressive strength of 4500 psi and a water cement ratio of 0.45. Slump: Maximum 4 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site.

B. Normal weight concrete for interior slabs, ramps, stairs and footings shall have a minimum compressive strength of 3500 psi and a water cement ratio of 0.50. Slump: Maximum 3 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site.

C. Normal weight concrete for exterior slabs, ramps and stairs to be exposed to deicing salts shall have a minimum compressive strength of 5000 psi and a water cement ratio of 0.45. Slump: Maximum 3 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site.

B. Optional Material: Fly ash may be substituted for (Portland) cement in normal weight and lightweight concrete up to a maximum of 40 percent by weight of the required minimum (Portland) cement. If fly ash is incorporated in a concrete design mix, make necessary adjustments to the design mix to compensate for the use of fly ash as a partial replacement for (Portland) cement.

1. Adjustments shall include the required increase in air-entraining admixture to provide the specified air content.

2. Lower early strength of the concrete shall be considered in deciding when to remove formwork.

C. Slump for Pumped Concrete: When a water-reducing admixture is not used, maximum slump shall be 4 inches. When a water-reducing admixture is used, maximum slump shall be 6 inches and when a high-range water-reducing admixture (superplasticizers) is used, maximum slump shall be 8 inches.

D. Design Air Content: Design air content for concrete required to be air entrained shall be 6 percent by volume, with an allowable tolerance of plus or minus 1.5 percent for total air content, except as otherwise specified. Use air-entraining admixture, not air-entrained cement. Concrete to be air-entrained shall be exterior foundation walls and piers, spectator seating area concrete beams and deck, all concrete columns, exterior slabs, ramps, and stairs.

E. ACI 301, Section 4.2.2.3; Change article to read as follows:

1. 4.2.2.3 - Size of Coarse Aggregates:

2. 4.2.2.3.a Normal Weight Concrete: Coarse aggregates shall conform to graduation requirements for various sizes as tabulated in Table No. 2 of ASTM C 33. The sizes of coarse aggregates for various classes of Work shall be as follows with all percentages being determined by weight.

3. 4.2.2.3.c For concrete Work having a minimum cross-sectional dimension of not more than 6 inches, the coarse aggregate shall be a well graded mixture of No. 67 (3/4" to No. 4) and No. 57 (1" to No. 4), provided that not more than 50 percent nor less than 30 percent shall be Size No. 67 and not more than 70 percent nor less than 50 percent shall be Size No. 57.

4. 4.2.2.3.d For concrete Work having a minimum cross-sectional dimension greater than 6 inches and not more than 12 inches, including concrete floors, the coarse aggregate shall consist of a mixture of No. 67, No. 57 and No. 467 (1 ½" to No. 4), providing that not more than 25 percent nor less than 10 percent shall be Size No. 67 and not more than 40 percent shall be Size No. 467.

5. 4.2.2.3.e For concrete Work having a minimum cross-sectional dimension of more than 12 inches, the coarse aggregate shall consist of a mixture of No. 67, No. 57 and No. 357 (2" to No. 4), providing not more than 25 percent nor less than 10 percent shall be Size No. 67 and not more than 40 percent shall be Size No. 357.

F. Admixtures: Do not use admixtures in concrete unless specified or approved in writing by the Architect.

G. ACI 301, Section 4.1.2.1 - Mixture Proportions:

1. Add the following to paragraph 4.1.2.1:
   a. Proposed design mix(es) for pumped concrete and the pumping equipment shall have been tested under actual field conditions with the maximum horizontal run and vertical lift required for this project.

2.03 JOINTS

A. ACI 301, Section 5.3.2.6 - Construction joints and other bonded joints:

1. Delete the following subparagraphs:
   a. Use an acceptable surface retarder in accordance with manufacturer's recommendations.
   b. Roughen the surface in an acceptable manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, or damaged concrete at the surface; or

B. ACI 301, Section 10.2.5 – Isolation-joint filler materials:

1. Add the following paragraphs:
    a. Except as otherwise shown on the Drawings, expansion joints shall be as follows:
    b. In joints required to receive a sealant, the joint filler shall be 1/2 inch thick and recessed as required to form a caulking slot.
    c. In joints not required to receive a sealant, the joint filler shall be 1/2 inch thick and extend through the full cross-section of the concrete.
    d. Tool edges of concrete with 1/8 inch radius edging tool.

2.04 PRODUCTION OF CONCRETE

A. Provide ready-mixed concrete, either central-mixed or truck-mixed, unless otherwise approved in writing by the Architect.

B. ACI 301, Section 5.3.2.1 Weather considerations

1. Delete paragraph under 5.3.2.1.c - Hot Weather, and add the following:
    a. 5.3.2.1.c Provide adequate controls to insure that the temperature of the concrete when placed does not exceed 90 degrees F., and make every effort to place it at a lower temperature. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set or cold joints. Ingredients may be cooled before mixing by shading the aggregates, fog spraying the coarse aggregate, chilling the mixing water or other approved means. Mixing water may be chilled with flake ice or well-crushed ice of a size that will melt completely during mixing, providing the water equivalent of the ice is calculated into the total amount of mixing water.

C. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement and curing.

1. In cold weather, comply with ACI 306R.
    a. When air temperature is below 40 degrees F (4 degrees C) heat the mixing water and, if necessary, the aggregates to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C) and not more than 80 degrees F (27 degrees C) at point of placement. If the mixing water is heated, do not exceed a temperature of 140 degrees F at the time it is added to the cement and aggregates.

2. In hot weather, comply with ACI 305R.
    a. When air temperature is between 85 degrees F (30 degrees C) and 90 degrees F (32 degrees C), reduce mixing and delivery time from 1 1/2 hours to 75 minutes, and when air temperature is above 90 degrees F (32 degrees C), reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Do not use items of aluminum for mixing, chuting, conveying, forming or finishing concrete, except magnesium alloy tools may be used for finishing.

B. Check items of aluminum required to be embedded in the concrete and insure that they are coated, painted or otherwise isolated in an approved manner.

C. Install waterstops in accordance with manufacturer's printed instructions.

D. Hardened concrete, reinforcement, forms, and earth which will be in contact with fresh concrete shall be free from frost at the time of concrete placement.

E. Do not deposit concrete in water. Keep excavations free of water by pumping or by other approved methods.

F. Prior to placement of concrete, remove all hardened concrete spillage and foreign materials from the space to be occupied by the concrete.

3.02 ADMIXTURE ADDITIONS AT THE SITE

A. Site additions shall be limited to high-range water-reducers, non-chloride accelerators, and corrosion inhibitors. Comply with manufacturers' printed instructions for discharge of admixtures shall be furnished.

B. High-Range Water-Reducers:

1. Concrete shall arrive at a slump of 2 to 4 inches (50 to 100 mm). Water additions at the Site shall be limited to comply with water-to-cementitious ratio requirements.

2. Following addition of high-range water-reduced concrete, a minimum of 70 revolutions or 5 minutes of mixing shall be completed to assure a consistent mixture.

C. All concrete with other admixture additions shall mix a minimum of 70 revolutions or 5 minutes to assure a consistent mixture.

3.03 PLACING

A. ACI 301, Section 5.3.2.3 Conveying equipment:

1. Add the following paragraphs:
   a. 5.3.2.3.d When pumping concrete, the lubricating mortar for the delivery line shall not be discharged into an area of concrete placement.
   b. 5.3.2.3.e The inside diameter of the delivery lines for pumped concrete shall be the greater of either a minimum of 5 inches or 3 times the maximum size of coarse aggregate.

B. ACI 301, Section 5.3.2.2 - Conveying:

1. Add the following paragraph:
   a. Operation of truck mixers and agitators and discharge limitations shall conform to the requirements of ASTM C 94.

C. ACI 301, Section 5.3.2.4 - Depositing:

1. Add the following paragraph:
   a. Do not allow concrete to free fall more than 4 feet.

3.04 REPAIRING SURFACE DEFECTS

A. ACI 301, Section 5.3,7 – Repair of surface defects:

1. Add the following paragraph:

B. 5.3.7.1.a Finish patched areas to match the texture of the surrounding surface.

C. ACI 301, Section 5.3.7.2 - Repair of tie holes:

1. Delete last paragraph in 5.3.7.2 and replace with the following:
   a. The patch mixture shall consist of a mixture of dry-pack mortar, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for placing and handling. For surfaces exposed to view, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

3.05 FINISHING FORMED SURFACES

A. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:

1. Rough Form Finish for concrete surfaces not exposed to view.

2. Smooth Form Finish for exterior concrete surfaces exposed to view. Remove forms as soon as removal operations will not damage concrete (reference ACI 301-05.2.3.2), and perform necessary patching.

3.06 SLABS

A. Slabs On Grade: Provide saw-cut type control joints unless otherwise shown, using the early entry dry saw-cut method. Saw-cut joints within 4 hours of finishing the slab.

B. ACI 301, Section 5.3.4 – Finishing unformed surfaces:

1. Add the following paragraph to section 5.3.4.1 Placement:

C. Provide monolithic finishes on concrete floors and slabs without the addition of mortar or other filler material. Finish surfaces in true planes, true to line, with particular care taken during screeding to maintain an excess of concrete in front of the screed so as to prevent low spots. Screed and darby concrete to true planes while plastic and before free water rises to the surface. Do not perform finishing operations during the time free water (bleeding) is on the surface.

D. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:

1. Floated Finish for:
   a. Treads and platforms of exterior steps and stairs.
   b. Slabs and fill over which waterproofing, roofing, vapor barrier, insulation, terrazzo, or resin bound flooring is required.

2. Troweled Finish for:
   a. Interior slabs that are to be exposed to view.
   b. Slabs and fill over which resilient wood flooring, resilient tile or sheet flooring, carpet, or thin-film coating system is required.
   c. Slabs and fill over which thin-set ceramic tile is required, except fine-broom finished surface.
   d. Treads and platforms of interior steps and stairs.

3. Broom or Belt Finish for:
   a. Exterior slab. Texture as approved by the Architect's Representative.

4. Scratched Finish for:
    a. Surfaces to be covered with ceramic tile set in a bonded thick mortar bed, except screed to a Class B tolerance.
    b. Surfaces to be covered with floor topping.

E. ACI 302 Chapter 8.2.8.2 - Tools for jointing; Saw-cutting.

1. Add the following paragraph:
    a. Early-entry dry-cut saws are required in place of conventional wet-cut saws.

F. Floor flatness and levelness tolerances: For flatness and levelness tolerances of floor slabs refer to ACI 302 Chapter 8.15. Floor surface tolerances shall be 1/8 inch over a horizontal distance of 10 feet in any direction, unless otherwise specified by floor profile quality classifications in ACI 302.

1. When flatness or levelness tolerances are not met then the floor shall be ground or scarified and repoured to meet specifications.

3.07 CURING AND PROTECTION

a. Cure all exposed concrete using supervised wet cure or an approved curing compound.

b. Hot Weather Concreting: Comply with ACI 305R whenever the atmospheric temperature or the form surface temperature is at or above 90 degrees F., or climatic conditions of wind and/or low humidity will cause premature drying of the concrete.

c. Curing Temperature: Maintain the temperature of the concrete at 50 degrees F. or above during the curing period. Keep the concrete temperature as uniform as possible and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete which exceeds 5 degrees F. in any one hour and 50 degrees F. in any 24-hour period.

d. Curing of Slabs to Receive Moisture-Sensitive Finish Flooring, including vinyl composition tile (VCT), rubber flooring, sheet vinyl, resilient tile, carpet, ceramic tile, wood flooring, and laminates:

1. Cure the slab by covering with a moisture retaining cover as defined above for a period of 7 days.

2. Do not add water (ponding or wet bulap)

3. Do not use curing compounds or cure-and-seal materials unless approved in writing by the Architect. Architect will require written approval from the adhesive and floor covering manufacturer that the curing compound or cure-and-seal material will not compromise the adhesion of the floor covering to the concrete slab, and will not require removal of the curing compound or cure-and-seal material prior to placement of the finish floor covering.

END OF SECTION

SECTION 03 54 00
CAST UNDERLAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Liquid-applied self-leveling floor underlayment.

1.02 REFERENCE STANDARDS

A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.

B. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.

C. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars 2021.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.

C. Manufacturer's Instructions.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the work of this section, and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.06 FIELD CONDITIONS

A. Do not install underlayment until floor penetrations and peripheral work are complete.

B. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.

C. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cementitious Underlayment:

1. ARDEX Engineered Cements; ARDEX V 1200 with ARDEX P51 Primer: www.ardexamericas.com/#sle.

2. Custom Building Products; CL-150 Self-Leveling Underlayment: www.custombuildingproducts.com/#sle.

3. Dayton Superior Corporation; Econolevel with Level Primer J42 : www.daytonsuperior.com/#sle.

4. Kaufman Products Inc; SureFlow 040: www.kaufmanproducts.net/#sle.

5. Koster American Corporation; Koster SL Premium Self-Leveling Underlayment: www.kosterusa.com/#sle.

6. LATICRETE International, Inc; LATICRETE SUPERCAP SC500 with LATICRETE SUPERCAP Primer Plus: www.laticretesupercap.com/#sle.

7. The QUIKRETE Companies; QUIKRETE® Self-Leveling Floor Resurfacer : www.quikrete.com/#sle.

8. Stauf USA LLC; SLC-540 Self Leveling Compound: www.staufusa.com/#sle.

9. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:

1. Compressive Strength: Minimum 4000 pounds per square inch after 28 days, tested per ASTM C109/C109M.

2. Flexural Strength: Minimum 1000 psi after 28 days, tested per ASTM C348.

3. Density: 125 pounds per cubic foot, nominal.

4. Final Set Time: 1-1/2 to 2 hours, maximum.

5. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch.

6. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.

B. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.

C. Primer: Manufacturer's recommended type.

D. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.02 PREPARATION

A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.

B. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.

C. Vacuum clean surfaces.

D. Prime substrate in accordance with manufacturer's instructions. Allow to dry.

E. Close floor openings.

3.03 APPLICATION

A. Install underlayment in accordance with manufacturer's instructions.

B. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft.

C. For final thickness over 1-1/2 inches, place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin application of the subsequent layer within 24 hours.

D. Place before partition installation.

E. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.

F. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.04 CURING

A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.

B. Air cure in accordance with manufacturer's instructions.

3.05 PROTECTION

A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.

B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

DIVISION 04 – MASONRY

SECTION 04 20 00

UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Clay facing brick.

C. Mortar and grout.

D. Reinforcement and anchorage.

E. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 04 01 00 - Maintenance of Masonry.

B. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

C. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.

D. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.

E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.

F. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2023.

G. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

H. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

I. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2023.

J. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

K. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.

L. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

M. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2019a.

N. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

O. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.

D. Manufacturer's Qualification Statement.

E. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

1. Maintain one copy of each document on project site.

B. Fire Rated Assemblies: Comply with applicable code for UL (FRD) Assembly No. as indicated on drawings.

C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:

1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.

2. Special Shapes: Provide nonstandard blocks configured for corners.
   a. Provide bullnose units for outside corners.

3. Nonloadbearing Units: ASTM C129.
   a. Lightweight.

4. Specialty Units: Where indicated on drawings, provide blocks with single vertical score on each exposed face.

2.02 BRICK UNITS

A. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.

1. Manufacturers:
   a. Belden Brick Company
   b. Endicott Brick
   c. Glen-Gery Brick
   d. Meridian Brick

2. Color and texture:
   a. Type 1: Provide face brick matching color range, texture, and size of existing adjacent brickwork.
   b. Type 2: Buff color, smooth, As selected by Architect from manufacturer's full range.
      1) Basis of Design: Endicott Brick: Copper Canyon

3. Nominal size: To match existing brick indicated for replacement.

4. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.03 MORTAR AND GROUT MATERIALS

A. Hydrated Lime: ASTM C207, Type S.

B. Mortar Aggregate: ASTM C144.

C. Grout Aggregate: ASTM C404.

D. Water: Clean and potable.

E. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.

1. Type: Types as scheduled in this section.

2. Color: Standard gray.

F. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type O mortar in accordance with ASTM C270 with the addition of water only.

1. Color: Mineral pigments added as required to produce approved color sample.

2.04 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.

B. Single Wythe Joint Reinforcement: ASTM A951/A951M.

1. Type: Ladder.

2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.

3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

C. Strap Anchors: Bent steel shapes, 1-1/2 inch width, 0.105 inch thick, 24 inch length, with 1-1/2 inch long, 90 degree bend at each end to form a U or Z shape or with cross pins, hot dip galvanized to ASTM A153/A153M Class B.

D. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.

E. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.

2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch-thick steel sheet, galvanized after fabrication.

3. Fabricate wire ties from 0.187-inch-diameter, hot-dip galvanized-steel wire unless otherwise indicated.

4. Contractor's Option: Unless otherwise indicated, provide any of the adjustable masonry-veneer anchors specified.

5. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a rib-stiffened, sheet metal anchor section with screw holes top and bottom, with a projecting vertical tab having a slotted hole for inserting wire tie.

    a. Hohmann & Barnard, Inc.; BL-407 Anchor: www.h-b.com
    b. Substitutions: See Section 01 60 00 - Product Requirements.

6. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a corrosion-resistant, self-drilling, eye-screw designed to receive wire tie. Eye-screw has spacer that seats directly against framing and is same thickness as sheathing and has gasketed washer head that covers hole in sheathing.

    a. Hohmann & Barnard, Inc.; 2-Seal Thermal Wing Nut Anchor: www.h-b.com
    b. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing: Use the following unless otherwise indicated:

1. Asphalt-Coated Copper Flashing: 5-oz./sq. ft. copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry.
    a. Manufacturers:
        1) Advanced Building Products, Inc.; Copper Fabric Flashing: www.advancedbuildingproducts.com
        2) Hohmann & Barnard, Inc.; C-Fab Flashing: www.h-b.com

B. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

C. Termination Bars for Flexible Flashing: Stainless steel bars 1/8 inch by 1 inch.

2.06 ACCESSORIES

A. Preformed Control Joints: Rubber or Neoprene material. Provide with corner and tee accessories, fused joints.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self-expanding; in maximum lengths available.

C. Weep/Cavity Vent Products: Use the following unless otherwise indicated:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
   a. Wire-Bond; Cellvent 3601: wirebond.com
   b. MortarNet Solutions; CellVent Standard: mortarnet.com.

D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Manufacturers:
   a. Wire-Bond; CavityNet DT (3611D): wirebond.com
   b. MortarNet Solutions; MortarNet MN 10-1 mortarnet.com

2. Configuration: Provide one of the following:
   a. Strips, full depth of cavity and 10 inches high, with dovetail-shaped notches 7 inches deep that prevent clogging with mortar droppings.
   b. Strips, not less than 3/4 inch thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.

E. Drip Edge: Stainless steel; compatible with membrane and adhesives.

F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.

1. Masonry below grade and in contact with earth: Type S.

2. Exterior, non-loadbearing masonry: Type N.

3. Interior, non-loadbearing masonry: Type O.

B. New Mortar for Old Brick: Proportion by volume only; no more than 20 percent of the total volume of Portland cement and lime combined to be Portland cement.

1. Sand: Match original mortar as closely as possible in color, size, and texture, without use of other additives.

2. Repointing Mortar: Use proportions from 1 part lime to 2 parts sand with no Portland cement, up to 2 parts Portland cement to 3 parts lime to 6 parts sand.

C. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

3.02 PREPARATION

A. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:

1. Bond: Running.

2. Coursing: One unit and one mortar joint to equal 8 inches.

3. Mortar Joints: Concave.

D. Brick Units:

1. Bond: Common, Flemish every sixth course to match existing brick bond.

2. Mortar Joints: Concave.

3.05 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar and mortar smears as work progresses.

E. Interlock intersections and external corners, except for units laid in stack bond.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

I. Isolate masonry partitions from vertical structural framing members with a control joint.

J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 REINFORCEMENT AND ANCHORAGE - GENERAL AND SINGLE WYTHE MASONRY

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.

E. Lap joint reinforcement ends minimum 6 inches.

F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.07 CAVITY WALLS

A. Bond wythes of cavity walls together as follows:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
   a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) ties.
   b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) ties to allow for differential movement regardless of whether bed joints align.

2. Masonry-Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Bond wythes of cavity walls together using bonding system indicated on Drawings.

C. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

D. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches 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.

3.08 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.

2. Embed tie sections in masonry joints.

3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.

4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 25 inches o.c. horizontally, with not less than one anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

B. Provide not less than 1 inch of airspace between back of masonry veneer and face of insulation.

1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.09 LINTELS

A. Install loose steel lintels over openings.

B. Maintain minimum 8 inch bearing on each side of opening.

3.10 GROUTED COMPONENTS

A. Lap splices minimum 24 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

3.11 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.

3.12 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.

1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.13 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.

B. Maximum Variation from Alignment of Columns: 1/4 inch.

C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

G. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.14 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

3.15 CLEANING

A. Remove excess mortar and mortar droppings.

B. Clean soiled surfaces with cleaning solution.

3.16 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

DIVISION 05 – METALS

SECTION 05 21 00

OPEN WEB STEEL JOISTS

PART 1 GENERAL

1.0 SUMMARY

A. This section includes the following:

1. Open-web K-series steel joists.

2. Joist accessories.

1.01 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Anchorage devices required to be built into masonry/concrete construction shall be installed under the Work of the applicable masonry/concrete section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Field Painting: Section 09 90 00.

B. Steel Decks: Section 05 31 00

C. Structural Steel: Section 05 12 00

1.03 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall conform to the requirements of the following:

1. Design, Fabrication, and Erection: "Standard Specifications for Open Web Steel Joists, K-Series", by the Steel Joist Institute (SJI Specifications).
   a. Change the second sentence of Paragraph 4.4 (c) to read "The magnitude and location of the design loads to be supported and the deflection requirements shall be clearly indicated on the Contract Drawings. The proper bracing shall be shown by the manufacturer on the erection drawings."
   b. Change the following subparagraphs of Paragraph 4.5 (a) to read as listed:
      1) c) "Thorough fusion shall exist between weld and base metal for the full length of the weld; such fusion shall be verified by visual inspection."
      2) d) "Unfilled weld craters are not acceptable and shall be repaired."

3) f) "The sum of surface (piping) porosity diameters shall not exceed 1/16 inch in any 1 inch of weld length."

4) g) Delete.

c. Change the second and third sentences of Paragraph 5.3 (a) to read "The ends of K-Series Joists shall extend a distance of not less than 5 inches over masonry or concrete supports and be attached to a steel bearing plate. This plate shall be located not less than 1 inch from the face of the wall and shall be not less than 6 inches wide perpendicular to the length of the joists."

d. In Paragraph 5.4 (c), change "following table" to "preceding table".

2. Standard Practice: "Recommended Code of Standard Practice for Steel Joists and Joist Girders", by the Steel Joist Institute (SJI Code).

3. High Strength Bolting: "Specification for Structural Joints using ASTM A325 or A490 Bolts, November 13, 1985", by the Engineering Foundation's Research Council on Riveted and Bolted Structural Joints (Specification for Structural Joints).

1.04 SUBMITTALS

A. Shop Drawings: Show application to project. Include the following:

1. Erection drawings, end bearing and anchorage details, bracing details, and (if required) details of extended ends and ceiling extensions.

2. Details for connection of other related work (if any), except do not show steel deck.

B. Quality Control Submittals:

1. Joist Delivery Schedule.

2. Mill Test Reports: Furnish 3 copies of certified reports of steel component compliance with the requirements of applicable ASTM specifications, or of 2.01 A. 4.

3. Certificate: Certification of joist manufacturer's compliance with inspection program provisions of the SJI Specifications.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Provide units manufactured by a member of the Steel Joist Institute.

B. Welder's Qualifications: Welding shall be performed only by welders, welding operators, and tackers who have been qualified as prescribed in the SJI Specifications to perform the type of welding required.

1.06 INSPECTION

A. Manufacturer's Quality Control Shop Inspection: Insure joist manufacturer's compliance with inspection program provisions of the SJI Specifications.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel joists in a manner to avoid overstressing or other damage. Comply with requirements in the SJI Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel for Chord and Web Sections: Structural steel conforming to one of the following:

1. ASTM A242.

2. ASTM A441.

3. ASTM A572, Grade 50.

4. Electric furnace produced steel meeting all requirements of ASTM A36, except that the chemical composition shall be adjusted during production to give minimum physical properties of 50 ksi yield point and 70 ksi tensile strength.

B. Steel for Bracing and Detail Material Not Proportioned for Calculated Stress: Structural steel conforming to one of the following:

1. ASTM A36, or any of those listed under A. above.

C. High-Strength Threaded Fasteners: ASTM A325 heavy hexagon structural bolts, nuts, and hardened washers.

D. Shop Paint: Standard shop paint complying with the SJI Specifications.

E. Bedding Mortar:

1. Cement Grout: 1 part Portland cement conforming to ASTM C 150, Type I or III, to 3 parts natural sand complying with ASTM C 404, size No. 2, mixed with minimum amount of water required for placement and hydration. Ratio by volume.

2. Shrink-Resistant Grout: Pre-mixed, factory-packaged, non-catalyzed, ferrous aggregate mortar grouting compound selected from the following:
   a. Embeco 636 by Master Builders.
   b. Ferrolith G-NC by Sonneborn.
   c. Ferro-Grout by L&M Construction Chemicals.
   d. Vibra-Foil by A.C. Horn.

2.02 FABRICATION

A. Do not fabricate Work of this Section until receipt of approved shop drawings. When drawings are "Approved as Noted", progress fabrication in conformity with the correction notes thereon and submit revised drawings for formal approval and record.

B. Furnish joists of sizes indicated on the Drawings.

C. Do not use connections which will interfere with bearing of steel deck on top chords.

D. Bridging: Horizontal bridging complying with the SJI Specifications.

E. Holes in Chord Members: Punch or drill approved holes in chord members where required for securing related work to joists. Deduct area of holes from chord area when calculating the strength of the member.

F. Extended Ends: Furnish extended ends on joists where indicated. Use joist manufacturer's standard method complying with Steel Joist Institute requirements and load tables.

G. Ceiling Extensions: Furnish ceiling extensions in areas where a ceiling is directly attached to or supported by the joist bottom chord. Extend ends to within one inch of finished wall surface. Use joist manufacturer's standard extension system of sufficient strength to support ceiling system.

H. Joist Ends: Manufacturer's standard ends complying with the SJI Specifications to suit type of supporting construction indicated, unless otherwise specified or shown.

I. Anchors: Furnish bearing plates, anchor bolts, and other required devices to be built into masonry and concrete construction. Furnish templates necessary for accurate location of anchors in other Work.

   1. Furnish unfinished threaded fasteners for anchor bolts unless otherwise indicated.

J. Header Units: Furnish header units to support tail joists at openings in floor and/or roof system not framed with steel shapes.

2.03 SHOP PAINTING

A. Remove loose mill scale, loose rust, weld slag and other foreign material from joists, bridging and accessories after fabrication.

B. Thoroughly clean joists, bridging and accessories. Remove oil and grease with solvent.

C. Apply one coat of shop paint, resulting in a continuous dry film thickness of not less than 1.0 mil, to the joists, bridging and accessories.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine surfaces to receive steel joists and bracing for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

1. Verify that supports are ready to receive joists.

2. Verify that there is sufficient end bearing area.

3.02 SURFACE PREPARATION

A. Thoroughly clean surfaces that will support the Work of this Section.

3.03 INSTALLATION

A. Install steel joists and accessories in accordance with the approved shop drawings.

B. Erect steel joists in compliance with the SJI Specifications.

1. Prepare and place shrink-resistant grout in accordance with grout manufacturer's printed instructions.

C. Carefully place joists on supporting construction. Adjust and align in accurate location and spacing before fastening.

D. Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

E. Bridging: Install bridging simultaneously with joist erection, before any construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

F. Fastening Joists: Connect joists to supporting structure in accordance with the "End Anchorage" requirements of the SJI Specifications, unless otherwise shown or indicated.

1. Fasten ends of joists resting on steel supports with a minimum of two 1/8 inch fillet welds, each 1 inch long, unless otherwise indicated.

2. Provide high-strength threaded fasteners for bolted connections of steel joists to steel columns, and at other locations where shown, installed in accordance with the Specification for Structural Joints. Provide a hardened washer under the fastener part to be turned in tightening.

END OF SECTION

SECTION 05 31 00

FLUTED STEEL ROOF DECK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel roof deck and accessories

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Field Touch-up Painting: Section 09 91 13.

1.3 REFERENCES

A. Comply with the following reference standards unless otherwise shown or specified:

1. Design: "Specification for the Design of Cold-Formed Steel Structural Members" by the American Iron and Steel Institute (AISI Specification).

2. Welding: "Structural Welding Code - Sheet Steel, AWS D 1.3", by the American Welding Society (AWS Code).

3. Steel Deck Institute (SDI): “Design Manual for Composite Decks, Form Decks, and Roof Decks, Publication 26.”

4. ASTM A 611 “Standard Specification for Steel, Carbon, Cold Rolled, Structural Quality.”

5. ASTM A 525 “Steel Sheet, Zinc Coated, Galvanized by the Hot Dip Process.”

1.4 SUBMITTALS

A. Shop Drawings: Show application to project. Prepare separate drawings, coordinated with, but not superimposed on, joist drawings or structural steel erection drawings. Show plan layout, deck span, support locations, edge of deck location of openings and reinforcing at openings, and attachment requirements.

B. Product Data: Manufacturer's printed specifications and installation instructions.

1.5 HANDLING AND STORAGE

A. Handle and stack materials carefully in order to prevent deformation or damage. During unloading and hoisting, take extra care to prevent damage to ends and sides of individual metal deck panels. Do no place panels in direct contact with the ground. Protect panels from the elements and keep panels dry.

1. If mud, dirt, or other foreign matter is accumulated on panels, remove such accumulation completely prior to installation.

1.6 QUALITY ASSURANCE

A. Fabricator and erector to submit documentation showing a minimum of 5 years experience with project of similar size and scope. All welders to submit documentation showing current AWS certification.

B. Deck Installation Inspection. By Owner's special inspector in accordance with Specification Section 01 45 33 Special Inspections and Testing.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fluted Deck and Metal Accessories: Sheet steel conforming to ASTM A 611 Grade C or ASTM A 653 SQ Grade 33. Before fabrication, sheet steel shall receive ASTM A 525, Class G 90, hot dip zinc coating; Accessories shall be fabricated of not lighter than 18 US Standard Gage sheet steel. Deck standard of function and quality shall be as manufactured by Vulcraft of the type, depth, and gauge shown on the drawings.

B. Self-Drilling Fasteners: No. 12-14 x 3/4 inch, hex washer head, self-drilling fastener with pilot point.

C. Flexible Closure Strips: Manufacturer's standard vulcanized, closed- cell, synthetic rubber closure strips.

D. Touch-up primer for galvanized surfaces: SSPC 20, Type I- Inorganic.

2.2 FABRICATION

A. Furnish units in lengths to be continuous over 3 spans wherever possible.

B. Steel deck shall conform to the properties indicated for a Vulcraft deck for the type, size, and gauge shown on the drawings. Roof deck shall be designed for 3-span minimum where possible.

C. Unless otherwise indicated or approved, fabricate deck for predetermined openings, and reinforce where required to maintain deck strength, alignment, and profile.

1. Small openings, as recommended by the deck manufacturer, may be field cut.

D. Accessories: Shop fabricated accessories, compatible with steel deck, as required to complete the Work, including, but not limited to, the following:

1. Sheet metal cants beneath flashings when required for roofing over steel deck.

2. Column closures, end closures, Z closures, and cover plates.

E. Progress shop fabrication from "APPROVED" or "APPROVED AS NOTED" detail drawings only.

1. When detail drawings are "APPROVED AS NOTED", progress fabrication in strict accordance with notes thereon.

2. Fabrication progressed from "DISAPPROVED" or "RETURNED FOR CORRECTION" detail drawings will be rejected. The contractor shall have no claim against the Owner for any costs or delays due to rejection of items fabricated from "DISAPPROVED" or "RETURNED FOR CORRECTION" detail drawings.

F. Fabricate deck units to provide a minimum of 2” lap over supports. Provide minimum of 1.5” bearing over steel supports.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine supporting framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of steel deck.

B. Do not start installation of metal deck until corresponding steel framework has been plumbed, aligned and completed and until temporary shoring, where required, has been installed. Coordinate installation sequence of metal deck with concrete encasement of steel beams.

C. Steel surfaces to which materials, provided under this Section, are to be welded, shall be free of paint, ice, water, oil, dirt, rust and other materials detrimental to welding.

D. Locate decking bundles to prevent overloading of supporting members

3.2 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer's printed instructions except where shown or specified otherwise.

1. Welding shall comply with the AWS Code.

2. Perform welding free of sharp points.

B. Place deck units on supporting steel framework and adjust to final position with ends bearing on supporting members and flutes in straight and true alignment through entire length of run before being permanently fastened. Do not stretch or contract side lap interlocks. Install temporary shoring before placing single span deck panels when required to meet manufacturer's recommendations.

C. End Bearing: Install deck units over supporting framing with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. Non-Composite Deck End Joints: Lapped 2 inches minimum.

D. Deck Fastening: Fasten deck units at perimeter supports with arc spot welds (puddle welds) not less than 3/4 inch diameter, at 6 inches on center. At intermediate supports, fasten deck units with arc spot welds (puddle welds) not less than 3/4 inch diameter, at 12 inches on centers, along the supporting members, unless more stringent requirements are indicated on the drawings or required by the fire resistance ratings indicated on the drawings. Weld the first and last deck flutes. Use welding washers for all deck lighter than 20 gage.

E. Side lap fastening: Fasten side laps at intervals not exceeding 24 inches, using one of the following methods, unless more stringent requirements are indicated on the drawings or required by the fire resistance ratings indicated on the drawings:

1. Mechanically fasten with self-drilling No.10 diameter or larger carbon steel screws.

F. Neatly field cut required openings, other than shop fabricated openings, after installation in accordance with the manufacturer's recommendations. Deck openings between 6" and 12" in size to be reinforced with 2x2x3/16 angles at each end of opening. Angles to be placed perpendicular to deck flutes and extend two full deck flutes beyond opening edge. Mechanically attach at each deck flute.

G. Closures: Install flexible closure strips to effectively seal underside of flutes where fluted decks extend over exterior walls and also above interior partitions where there are no ceilings below the fluted deck.

H. Immediately after welding deck and other metal components into position, coat welds, burned areas, and damaged surface coating with touch-up prime paint.

END OF SECTION

SECTION 05 40 00

COLD-FORMED STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Exterior wall framing

C. Roof Joists

1.2 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel.

B. Section 07 21 00 - Thermal Insulation: Insulation within framing members.

C. Section 07 25 00 - Weather Barriers.

D. Section 07 92 00 - Joint Sealants.

1.3 REFERENCE STANDARDS

A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.

D. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.

F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.5 SUBMITTALS

A. See Section 013300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.

C. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.

1. Manufacturer's printed specifications and installation instructions for each type of metal framing and accessory, including data required to show compliance with the Drawings and Specifications.

D. Calculations: Provide Cold Framed Structural Metal Framing Contractor’s Design Engineer’s calculations demonstrating that the cold formed framing system will comply with the performance requirements of this section and the contract drawings. Refer to loading information provided on Sheet S001 and in relevant plans and details.

E. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.

1. Include the following in an early submission:
   a. Erection drawings indicating sizes and locations of all metal framing members.
   b. Anchor bolt plan showing anchor bolts, if any, to be placed in cast-in-place concrete Work.
   c. Show plans and elevations at not less than 1/4 inch to 1'-0” scale, and details at not less than 1-1/2 inch to 1'-0” scale.

2. Indicate ceiling joist layout and support.

3. Describe method for securing bearing and shear walls to floor joist framing, and floor joists framing to supporting structure.

4. Provide design engineer's stamp on shop drawings.

F. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in New York State.

B. Calculate structural properties of framing members in accordance with requirements of AISI North American Specification for the Design of Cold-Formed Steel Structural Members.

C. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

F. Certification: Affidavit certifying that sheet steel complies with specified quality, grade, and zinc-coating.

G. Fire Rated Construction: Wherever a fire resistance classification is indicated for metal framing components, provide framing and accessories which have been tested and classified or listed for the construction and rating shown.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver metal framing to the Site in manufacturer's unopened containers or bundles, identified with brand, type, and gage.

B. Protect metal framing from damage and rusting. Store off the ground in dry, ventilated space.

C. Store and handle metal framing in a manner that will not cause distortion.

1.8 PROJECT CONDITIONS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal Framing, Connectors, and Accessories:

1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.

2. Marino\Ware: www.marinoware.com.

3. The Steel Network, Inc: www.SteelNetwork.com.

4. Substitutions: See General Requirements.

2.2 FRAMING SYSTEM

A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

B. Design Criteria: Provide completed framing system having the following characteristics:

1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI North American Specification for the Design of Cold-Formed Steel Structural Members.

2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.

3. Design Loads: As indicated on the drawings.

4. Live load and wind load deflection meeting the following, unless otherwise indicated:
   a. Roof Joists: Maximum vertical deflection under design live load of 1/240 of span.
   b. Wall Studs: Maximum lateral deflection under wind load of 1/600 of span (brick exterior veneer),or l/360 (metal siding).

5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.3 FRAMING MATERIALS

A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.

1. Gage and depth: As indicated on the drawings.
   a. Members of 12, 14, and 16 Gage Steel: Galvanized, structural quality sheet steel; ASTM A653, Grade D (minimum yield 50 ksi).
   b. Members of 18 and 20 Gage Steel: Galvanized, structural quality sheet steel; ASTM A653, Grade A (minimum yield 33 ksi).

2. Galvanized in accordance with ASTM A653/A653M G90/Z275 coating.

3. For exterior wall studs, provide studs with a minimum stud gauge of 16.

B. Framing Connectors: Factory-made formed steel sheet, ASTM A653/A653M SS Grade 50, with G60/Z180 hot dipped galvanized coating and factory punched holes.

1. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold Formed Steel Structural Members; minimum 16 gage, 0.06 inch thickness.

2. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, screws and anti-friction bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
   a. Where top of non-bearing stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical movement without affecting studs; allow for minimum movement of 1/2 inch.
   b. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.
   c. Acceptable Products: VertiClip(r) or DriftClip(tm) manufactured by The Steel Network Inc.

3. Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners and for all bearing wall stud framing connections.

2.4 ACCESSORIES

A. Bracing, Furring, Bridging, Strapping, Reinforcement, Stiffeners, Plates, Gussets, Clip Angles, and Hangers: Unless otherwise indicated, metal framing manufacturer's standard products formed from ASTM A653 galvanized, structural quality sheet steel. Thickness and grade shall be determined by application requirements, with a minimum thickness of 20 gage and a minimum yield of 33 ksi.

B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.5 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers:

1. Cadmium plated, No. 12-14 x 3/4 inch, hex washer head, self-drilling, self-tapping fastener with pilot point.

B. Anchorage Devices: Powder actuated.

1. Power-Actuated Fasteners: Low velocity, powder activated, threaded studs complying with ASTM E 1190 and zinc coated in accordance with ASTM B633, Type III, Classification 5.
   a. Minimum Stud Size: 1/4-20 thread, 0.145 inch dia shank, with 1/4-20 nut and 5/8 inch outside dia washer.
   b. Stud Material: ASTM A510 1060 or 1065 steel.

c. Minimum Core Hardness: 51-56 Rockwell C.
d. Minimum Tensile Strength: 285,000 psi.
e. Minimum Shear Strength: 182,000 psi.

C. Galvanizing: Hot-dip process complying with ASTM A525, Coating Designation G 60.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Anchorage Devices: Power actuated, Drilled expansion bolts, Screws with sleeves, or ASTM A325 High Strength Bolts.

F. Welding: In conformance with AWS D1.1.

2.6 FABRICATION

A. Fabricate metal framing in accordance with “Approved” or “Approved as Noted” fabrication drawings only.

B. Repairing Galvanizing: Clean shop welded and abraded surfaces, and repair them with a 2 mil (dry) minimum thick coating of galvanizing repair paint. Comply with paint manufacturer's application instructions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building framing components are ready to receive work.

B. Verification of Conditions: Examine surfaces to receive metal framing for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

C. Verify field measurements and adjust installation as required.

3.2 INSTALLATION

A. Install metal framing and accessories in accordance with approved shop drawings, and with the metal framing manufacturer's printed installation instructions.

B. Provide temporary bracing to ensure stability of the structure during construction.

C. Repairing Galvanizing: Clean field welded and abraded surfaces, and repair them with a 2 mil (dry) minimum thick coating of galvanizing repair paint. Comply with paint manufacturer's application instructions.

D. Tolerances:

1. Vertical Alignment (Plumbness) of Studs: Within 1/960th (1/8 inch in 10 feet) of the height.

2. Horizontal Alignment (Levelness) of Walls: Within 1/960th (1/8 inch in 10 feet) of their respective lengths.

3. Spacing of Studs: Not more than + 1/8 inch from the designed spacing, providing that the cumulative error does not exceed the requirements of the finishing materials.

E. For metal framing indicated to receive insulation, install full width insulation in voids which will be inaccessible after erection.

F. Installation of Runner Tracks:

1. Install continuous bottom and top tracks of size and gage shown. Align track accurately and, unless otherwise shown, attach to supporting structure with power-driven fasteners at 16 inches oc. Install fasteners at corners and ends of tracks.

2. At track butt joints, securely attach abutting pieces of track to a common structural element, or splice them with a welded butt joint.

3.3 INSTALLATION OF JOISTS

A. Install framing components in accordance with manufacturer's instructions.

B. Make provisions for erection stresses. Provide temporary alignment and bracing.

C. Set ceiling joists parallel and level, with lateral bracing and bridging.

1. Install bridging at joist ends and at intermediate supports, unless joists are otherwise restrained from rotation.

2. Unless otherwise shown, install joists with a minimum bearing of 1-1/2 inches at end supports and 3-1/2 inches at intermediate supports.

D. Provide web stiffeners at reaction points.

E. Touch-up field welds and damaged galvanized surfaces with primer.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel items.

B. Steel framing and supports for applications where framing and supports are not specified in other sections.

1.02 PRODUCTS FURNISHED, BUT NOT INSTALLED, UNDER THIS SECTION

A. Loose steel lintels.

1.03 RELATED REQUIREMENTS

A. Section 04 20 00 - Unit Masonry: Placement of metal fabrications in masonry.

1.04 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

C. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

D. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

F. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).

G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

H. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

I. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.06 QUALITY ASSURANCE

A. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.

E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209/B209M, 5052 alloy, H32 or H22 temper.

C. Bolts, Nuts, and Washers: Stainless steel.

D. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

A. Lintels: As detailed; prime paint finish.

B. Door Frames for Overhead Door Openings and Wall Openings: Channel sections; prime paint finish.

2.05 FINISHES - STEEL

A. Prime paint steel items.

1. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prime Painting: One coat.

2.06 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Perform field welding in accordance with AWS D1.1/D1.1M.

D. Obtain approval prior to site cutting or making adjustments not scheduled.

E. After erection, prime welds, abrasions, and surfaces not shop primed .

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 51 33

METAL LADDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prefabricated vertical roof access ladders.

B. Prefabricated inclined ships ladders.

1.02 REFERENCE STANDARDS

A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008 (Reaffirmed 2018).

B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

C. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2019a.

D. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.

E. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

C. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B211/B211M, 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209/B209M, 5052 alloy, H32 or H22 temper.

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.

D. Bolts, Nuts, and Washers: Stainless steel.

2.02 PREFABRICATED VERTICAL LADDERS

A. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.

1. Components: Manufacturer's standard rails, rungs, treads, handrails. returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.

2. Materials: Aluminum; ASTM B211/B211M 6063 alloy, T52 temper.

3. Finish: Mill finish aluminum.

4. Manufacturers:
   a. Industrial Ladder & Scaffolding, Inc.: www.anyladder.com/#sle.
   b. O'Keeffe's Inc: Model 503A: www.okeeffes.com/#sle.
   c. Precision Ladders, LLC; Fixed Aluminum Wall Ladder: www.precisionladders.com/#sle.
   d. Substitutions: See Section 01 60 00 - Product Requirements.

5. Fabrication and Dimensions:
   a. Width: 24" clear between side rails.
   b. Rungs: 1" square, nominal
      1) Serrated surface.
   c. Side Rails: 3" minimum, with 1/8" minimum wall thickness.
   d. Mounting brackets: 9" high, sized to maintain minimum distance of 7" between centerline of rungs and wall surface.
   e. Platform: 24" minimum depth, with serrated walking surface 5" minimum above edge of roof.

2.03 PREFABRICATED INCLINED SHIPS LADDERS

A. Type: Fixed, inclined, aluminum standard ship ladder with handrail.

B. Manufacturers:

1. UPNOVR, Inc.; Model U-501: www.upnover.com

2. Substitutions: See Section 01 60 00 “Product Requirements”

C. Inclined Ship Ladder:

1. Angle of inclination: 75 degrees.

2. Space stringers 24 inches apart.

3. Treads: 6 inches wide by 1-3/4 inches deep aluminum channel shaped section with corrugated surface.
   a. Equally space treads.
   b. Minimum riser height: 4 inches.
   c. Maximum riser height: 7 inches
   d. Connect treads to stringers with bolts to allow for future replacement.

4. Stringers: 6 by 2 inches aluminum channel.

5. Handrails: fabricate from 1-1/4 inch diameter aluminum pipe.
   a. Form returns with 6 inch radius.
   b. Attach rail to stringer with pipe sections spaced at approximately 30 inches such that rail projects approximately 6 inches above stringer.
   c. Locate bottom of handrail 36 inches above lower roof level.
   d. Extend rail above ladder such that top of rail is 42 inches above roof level.

2.04 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Obtain approval prior to site cutting or making adjustments not scheduled.

3.03 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 52 13

PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Guardrails for rooftop equipment

1.02 RELATED REQUIREMENTS

A. Section 04 20 00 - Unit Masonry: Placement of anchors in masonry.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

E. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

F. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2021.

G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

H. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).

I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.

D. Fabricator's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

B. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months.

C. Fabricator Qualifications:

1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.

B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 50 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

D. Allow for expansion and contraction of members and building movement without damage to connections or members.

E. Dimensions: See drawings for configurations and heights.

1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.

2. Intermediate Rails: 1-1/2 inches diameter, round.

3. Posts: 1-1/2 inches diameter, round.

F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

1. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.

2. Posts: Provide adjustable flanged brackets.

G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 STEEL RAILING SYSTEM

A. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.

B. Steel Pipe: ASTM A53/A53M Grade B Schedule 80, black finish.

C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.03 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

D. Welded Joints:

1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.

2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.

3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Weld connections that cannot be shop welded due to size limitations.

1. Weld in accordance with AWS D1.1/D1.1M.

2. Match shop welding and bolting.

3. Clean welds, bolted connections, and abraded areas.

4. Touch up shop primer and factory-applied finishes.

5. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Install railings in compliance with ADA Standards for accessible design at applicable locations.

D. Anchor railings securely to structure.

E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roofing nailers.

B. Preservative treated wood materials.

C. Concealed wood blocking, nailers, and supports.

1.02 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. AWPA U1 - Use Category System: User Specification for Treated Wood; 2023.

C. PS 20 - American Softwood Lumber Standard; 2021.

D. SPIB (GR) - Standard Grading Rules; 2021.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and application instructions.

1.04 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.

2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

1. Lumber: S4S, No.2 or Standard Grade.

2. Boards: Standard or No.3.

2.03 ACCESSORIES

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2.04 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment:

1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.10 lb/cu ft retention.
   a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
   b. Treat lumber in contact with roofing, flashing, or waterproofing.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

D. Provide the following specific nonstructural framing and blocking:

1. Cabinets and shelf supports.

END OF SECTION

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation at cavity wall construction, perimeter foundation wall, underside of floor slabs, and exterior wall behind unit masonry wall finish.

B. Batt insulation and vapor retarder in exterior wall construction.

C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

A. Section 07 27 00 - Air Barriers: Separate air barrier materials.

B. Section 07 53 23 - EPDM Thermoset Single Ply Roofing: Insulation installed above roof deck as part of roofing assembly.

1.03 DEFINITIONS

A. Mineral Fiber Material Composition: Insulation referred to as mineral fiber block, board, and blanket insulation is composed of fibers from mineral based substances such as rock, slag, or glass and processed from the molten state into fibrous form.

1. Based on type of insulation substance, the material will be referred to as a mineral fiber when having a rock or slag base, and glass fiber with a glass or silica sand base, also considered a mineral.

2. Insulation blankets are flexible units consisting of felted, bonded, or unbonded fibers formed into rolls or flat cut pieces referred to as batts; rolls are simply longer versions of batts.

3. For additional information about mineral fiber and the various classification types, refer to the following reference standards; ASTM C553, ASTM C612, ASTM C665, and ASTM C726.

1.04 REFERENCE STANDARDS

A. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

C. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).

D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.

E. ASTM C726 - Standard Specification for Mineral Wool Roof Insulation Board; 2017.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

G. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024.

H. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2024.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

1.06 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.

B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

C. Insulation Inside Masonry Cavity Walls: Extruded polystyrene (XPS) board.

D. Insulation Over Metal Stud Framed Walls, Continuous: Extruded polystyrene (XPS) board.

E. Insulation on Inside of Concrete and Masonry Exterior Walls: Extruded polystyrene (XPS) board.

F. Insulation in Metal Framed Walls: Batt insulation with separate vapor retarder.

2.02 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.

1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.

2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.

3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.

4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.

5. Board Edges: Square.

6. Products:
   a. DuPont de Nemours, Inc; Styrofoam Brand Cavitymate Ultra : building.dupont.com/#sle.
   b. Kingspan Insulation LLC; GreenGuard GG25-LG XPS Insulation Board: www.kingspan.com/#sle.
   c. Owens Corning Corporation; FOAMULAR Type 250 Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
   d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 MINERAL FIBER BLANKET INSULATION MATERIALS

A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.

1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.

2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.

3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.

4. Formaldehyde Content: Zero.

5. Thermal Resistance: As indicated on drawings.

6. Thickness: As indicated on drawings.

7. Facing: Unfaced

8. Products:
   a. CertainTeed Corporation: www.certainteed.com/#sle.
   b. Johns Manville: www.jm.com/#sle.
   c. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
   d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Mineral Wool Blanket Thermal Insulation: Flexible or semi-rigid preformed insulation, complying with ASTM C665.

1. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.

2. Thermal Resistance: As indicated on drawings.

3. Thickness: As indicated on Drawings

4. Products:
   a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com/#sle.
   b. ROCKWOOL; COMFORTBATT: www.rockwool.com/#sle.
   c. Thermafiber, Inc; SAFB: www.thermafiber.com/#sle.
   d. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

A. Interior Vapor Retarder: Modified polyethylene/polyacrylate (PE/PA) film reinforced with polyethylene terephthalate (PET) fibers, 12 mil, 0.012 inch thick.

1. Width: 4.9 feet.

B. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.

1. Application: Sealing of interior circular penetrations, such as pipes or cables.

2. Width: Are required for application.

C. Self-Adhered Transition Flashing: Multipurpose, self-adhered flashing with modified butyl adhesive, polyester fiber top sheet, and polypropylene interlayer.

1. Application: Primerless adhesion for use as through-wall flashings and wall transitions to roof and below-grade systems.

2. Thickness: 45 mil, 0.045 inch, nominal.

3. Size: 6 inches wide, in rolls 75 feet long.

D. Flashing Tape: Special reinforced film with high performance adhesive.

1. Application: Window and door opening flashing tape.

2. Width: As required for application.

E. Gas-Actuated Insulation Fasteners: Galvanized steel pins driven through polypropylene anchor with 2-1/4-inch diameter washer head; suitable for fastening insulation to concrete, CMU, or steel studs, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

F. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Install boards horizontally on foundation perimeter.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

A. Apply adhesive to back of boards:

1. Three continuous beads per board length.

B. Install rigid insulation directly to steel studs or exterior grade sheathing at 16 inches on center with manufacturer recommended mechanical fasteners, and tape joints with manufacturer's minimum 4 inches wide sealant tape; comply with ASTM E2357.

C. Install boards horizontally on walls.

1. Place boards to maximize adhesive contact.

2. Install in running bond pattern.

3. Butt edges and ends tightly to adjacent boards and protrusions.

D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

E. Tape insulation board joints.

3.04 BOARD INSTALLATION AT CAVITY WALLS

A. Apply adhesive to back of boards:

1. Three continuous beads per board length.

B. Install boards to fit snugly between wall ties.

C. Install boards horizontally on walls.

1. Place boards to maximize adhesive contact.

2. Install in running bond pattern.

3. Butt edges and ends tightly to adjacent boards and protrusions.

4. Place impale fastener locking discs.

D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.05 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.06 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over face of member

F. Tape seal tears or cuts in vapor retarder.

G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.

3.07 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 27 00

AIR BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air barriers.

1.02 RELATED REQUIREMENTS

A. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with air barriers.

1.03 DEFINITIONS

A. Air Barrier: Airtight barrier made of material that is virtually air impermeable but water vapor permeable, both to amount as specified, with sealed seams and sealed joints to adjacent surfaces.

1.04 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).

B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on material characteristics, performance criteria, and limitations.

PART 2 PRODUCTS

2.01 AIR BARRIER MATERIALS (AIR IMPERMEABLE AND WATER VAPOR PERMEABLE)

A. Air Barrier, Fluid Applied: Vapor permeable, elastomeric waterproofing.

1. Air Barrier Coating:
   a. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
   b. Water Vapor Permeance: 11 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure B - Water Method, at 73.4 degrees F.
   c. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 90 days of weather exposure.
   d. Elongation: 300 percent, minimum, when tested in accordance with ASTM D412.
   e. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
   f. Nail Sealability: Pass, when tested in accordance with ASTM D1970/D1970M.
   g. Sealants, Tapes and Accessories: As recommended by coating manufacturer.
   h. Products:
      1) Carlisle Coatings and Waterproofing, Inc; Fire Resist Barrithane VP: www.carlisleccw.com/#sle.
      2) DuPont de Nemours, Inc; Tyvek Fluid Applied WB+ with Tyvek Fluid Applied Flashing and Joint Compound, Sealant for Tyvek Fluid Applied System, and StraightFlash: building.dupont.com/#sle.
      3) GCP Applied Technologies; Perm-A-Barrier VPL 50RS UV Stable: www.gcpat.com/#sle.
      4) Henry Company; Air-Bloc 17MR: www.henry.com/#sle.
      5) W. R. Meadows, Inc; Air-Shield TMP: www.wrmeadows.com/#sle.
      6) Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Air Barrier and Adjacent Substrates: As indicated or in compliance with air barrier manufacturer's installation instructions.

B. Stainless Steel Flashing: Flexible flashing with 2 mil, 0.002 inch thick Type 304 stainless steel sheet, 8 mil, 0.008 inch of butyl adhesive and siliconized release liner.

1. Roll Length: 50 feet long.

2. Width: 6 inches wide.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready for work of this section.

B. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.

C. Do not proceed with this work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

B. Air Barriers: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.

D. Fluid-Applied Coatings or Membranes:

1. Prepare substrate in accordance with manufacturer's installation instructions; treat joints in substrate and between dissimilar materials as indicated.

2. Where exterior masonry veneer is being installed, install masonry anchors before installing air barrier over masonry; provide airtight seal around anchors.

3. Apply bead or trowel coat of mastic sealant with minimum thickness of 1/4 inch along coating seams, rough cuts, and as recommended by manufacturer.

4. Use flashing to seal to adjacent construction and to bridge joints in coating substrate.

E. Openings and Penetrations in Exterior Air Barriers:

1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto air barrier and at least 6 inches up jambs; mechanically fasten stretched edges.

2. At openings with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.

3. At openings with nonflanged frames, seal air barrier to each side of framing at opening using flashing at least 9 inches wide, and covering entire depth of framing.

4. At head of openings, install flashing under air barrier extending at least 2 inches beyond face of jambs; seal air barrier to flashing.

5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.

6. Service and Other Penetrations: Form flashing around penetrating item and seal to air barrier surface.

3.04 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 42 93

SOFFIT PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes metal soffit panels.

B. Related Sections:

1. Section 07 62 00 “Sheet Metal Flashing and Trim” for roof fascia trim.

1.02 REFERENCE STANDARDS

A. AAMA 621-2002: Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates

B. ASTM A 653/A 653M-09: Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C. ASTM A 755/A 755M-03 (Reapproved 2008): Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products

D. ASTM A 792/A 792M-09a: Specification for Steel Sheet, 55 Percent Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

E. ASTM B 209-07: Specification for Aluminum and Aluminum-Alloy Sheet and Plate

F. ASTM C 645-09a: Specification for Nonstructural Steel Framing Members

G. ASTM C 754-09a: Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

H. ASTM C 920-08: Specification for Elastomeric Joint Sealants

I. ASTM C 1311-02: Specification for Solvent Release Sealants

J. ASTM D 2244-09b: Practice for Calculation of Color Differences from Instrumentally Measured Color Coordinates

K. ASTM D 4214-07: Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Product Test Reports: For each product, tests performed by a qualified testing agency.

E. Sample Warranties: For special warranties.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof eave, including fascia, and soffit as shown on Drawings; approximately four panels wide by full eave width, including attachments and accessories.

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.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, 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 horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.07 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.08 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

1.09 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
    a. Structural failures including rupturing, cracking, or puncturing.
    b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.

2. Other Design Loads: As indicated on Drawings.

3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.

2.02 METAL SOFFIT PANELS

A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners inside laps. Include accessories required for weathertight installation.

B. Flush-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and a flat pan between panel edges; with flush joint between panels.

1. Manufacturers:
a. AEP Span; A BlueScope Steel Company.
b. ATAS International, Inc.
c. MBCI.
d. PAC-CLAD; Petersen Aluminum Corporation.
e. Substitutions: See Section 01 60 00 "Product Requirements".

2. Materials: Provide one of the following:
   a. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
      1) Nominal Thickness: 24 gauge (0.028 inch).
   b. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
      1) Thickness: 0.032 inch.
      2) Surface: Smooth, flat finish.
3. Exterior Finish: Two-coat fluoropolymer.
4. Color: As selected by Architect from manufacturer's full range.
5. Panel Coverage: 12 inches (305 mm).
6. Panel Height: 1.0 inch (25 mm).

2.03 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

   1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape ½- inch wide and 1/8 inch thick.

2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.04 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, 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.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.

5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
   a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.05 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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 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. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

D. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.01 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 the Work.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.03 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.

2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.

3. Install screw fasteners in predrilled holes.

4. Locate and space fastenings in uniform vertical and horizontal alignment.

5. Install flashing and trim as metal panel work proceeds.

6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.

2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.

3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.

4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.04 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. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 53 23

EPDM THERMOSET SINGLE-PLY ROOFING - CARLISLE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Adhered roof system with ethylene propylene diene monomer (EPDM) roofing membrane.

B. Insulation, flat and tapered.

C. Vapor retarder.

D. Roofing stack boots and walkway pads.

1.02 RELATED REQUIREMENTS

A. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashing and reglets.

1.03 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.

C. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015, with Editorial Revision (2022).

D. FM DS 1-28 - Wind Design; 2015, with Editorial Revision (2024).

E. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's written information listed below.

1. Product data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.

C. Shop Drawings: Indicate joint or termination detail conditions and setting plan for tapered insulation.

D. Specimen Warranty: For approval.

E. Manufacturer's Qualification Statement.

F. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty (20) years of documented experience.

B. Installer Qualifications: Company specializing in performing work of this section:

1. Approved by membrane manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Protect products in weather protected environment, clear of ground and moisture.

C. Protect foam insulation from direct exposure to sunlight.

D. Keep Safety Data Sheets (SDS) at the project site at all times during transportation, storage, and installation of materials.

E. Comply with requirements from Owner to prevent overloading or disturbance of the structure when loading materials onto the roof.

1.08 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather. Refer to manufacturer's written instructions.

B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above 90 degrees F.

C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

E. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.

F. Do not allow grease, oil, fats, or other contaminants to come into direct contact with membrane.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Roof Manufacturer's System Warranty: Provide manufacturer's non-prorated Total System Warranty covering both labor and materials with no dollar limitation, including the following:

1. Warranty Period: 20 years from date of Substantial Completion.

2. The maximum wind speed coverage shall be peak gusts of 90 mph measured at 10 meters above ground level

3. Warranty includes roof membrane, base flashings, roof insulation, fasteners, substrate board, and other components of roofing system.

4. Pre-fabricated edge metal systems are required on this project and to be included in the Edge-to-Edge Total System warranty

5. Certify water tightness of roof.

6. Cover replacement costs of materials and labor at the time of repair.

7. Provide warranty coverage information in this order with submittal before starting the project.

C. Special Project Warranty: Submit roofing Installer's warranty, signed by Installer, covering the Work of this Section, including all components of roofing system for the following warranty period:

1. Warranty Period: Two years from date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carlisle SynTec Systems: www.carlisle-syntec.com/#sle.

B. Johns Manville; JM EPDM NR FIT: www.jm.com

C. Firestone Building Products Co.; RubberGard EPDM PT: www.firestonebpco.com

D. The specified materials/products of Carlisle SynTec Systems are the design standard to which materials/products of other accepted manufacturer(s) shall comply.

E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ROOFING APPLICATIONS

A. EPDM Membrane Roofing: One ply membrane, adhered, over insulation.

B. Roofing Assembly Performance Requirements and Design Criteria:

1. General Performance: Installed roofing system and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and flashings shall remain watertight.
   a. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
   b. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D 3746, ASTM D 4272, or the Resistance to Foot Traffic Test in FM Approvals 4470.

2. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience

3. Roof Covering External Fire Resistance Classification: Class A when tested per UL 790.

4. Wind Uplift:
   a. Designed to withstand wind uplift forces calculated with ASCE 7.

5. Factory Mutual Classification: Class 1 and windstorm resistance of 1A-90, in accordance with FM DS 1-28.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

A. Single Source Responsibility: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.

B. Membrane:

1. Material: Ethylene propylene diene monomer (EPDM); ASTM D4637/D4637M, Type I (non-reinforced).

2. Thickness: 60 mil, 0.060 inch, minimum.

3. Sheet Width: Factory fabricated into largest sheets possible.

4. Color: Black.

5. Products:
   a. Carlisle SynTec Systems; Sure-Seal.

C. Seaming Materials: Factory-applied seam tape, width as recommended by manufacturer, but not less than 6 inches.

D. Vapor retarder is a minimum 40 mil composite sheet consisting of a self-adhering rubberized asphalt membrane. The underlayment board shall be primed with Low VOC Carlisle Cav-Grip in accordance with manufacturer's specifications. Vapor retarder must have a perm rating of 0.05 or less as per ASTM E90. Vapor retarder must be rated by the manufacturer as a temporary roof with an allowable exposure to the elements for 90 days.

E. Flexible Flashing Material: Same material as membrane.

F. Base Flashing: Provide waterproof, fully adhered base flashing system at all penetrations, plane transitions, and terminations.

2.04 INSULATION

A. Polyisocyanurate (ISO) Board Insulation: ASTM C1289, Type II, Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of the core foam; Grade 2.

1. Compressive Strength: 20 psi

2. Product:
   a. Carlisle InsulBase.

3. Size: 48 by 96 inches

B. Tapered Insulation: Provide factory-tapered insulation boards.

C. Material: Match roof insulation.

1. Minimum Thickness: 1/2 inch

2. Slope:
   a. Roof Field: 1/8 inch per foot unless otherwise indicated on Drawings.
   b. Saddles and Crickets: 1/4 inch per foot unless otherwise indicated on Drawings.

2.05 ACCESSORIES

A. Prefabricated Flashing Accessories:

1. Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.

2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.

3. Sealant Pockets: Same material as membrane, with manufacturer's standard accessories, in manufacturer's standard configuration.

4. Carlisle SynTec Systems; Sure-Seal Pressure-Sensitive Reinforced Universal Securement Strip (RUSS):
   a. 6 inches wide, 45 mil, 0.045 inch thick, reinforced EPDM membrane with 3 inches wide, 30 mil, 0.030 inch thick cured synthetic rubber with pressure-sensitive adhesive laminated to one edge.

B. Insulation Adhesive: Two component polyurethane, expanding foam.

C. Membrane Adhesive: As recommended by membrane manufacturer.

D. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

E. Sealants: As recommended by membrane manufacturer.

F. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

G. Cleaner: Manufacturer's standard, clear, solvent-based cleaner.

H. Primer: Manufacturer's recommended product.

I. Edgings and Terminations: All metal edging shall be Factory Mutual Approved.

1. METAL EDGE QUALITY ASSURANCE: High performance gravel stop shall be CERTIFIED by the gravel stop manufacturer to comply with ANSI/SPRI Standard ES-1-98. Roof edge/gravelstop shall meet performance design criteria according to the following test standards:

a. ANSI/SPRI ES-1-98Test Method RE-1 Test for Roof Edge Termination of Single-ply Roofing Membranes: The fascia system shall be tested to secure the membrane to minimum 100 lbs/ft in accord with the ANSI/SPRI ES-1-98 Test Method RE-1. Use the current edition of ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
b. ANSI/SPRI ES-1-98Test Method RE-2 Pull-Off Test for Fascia: The fascia system shall be tested in accord with the ANSI/SPRI ES-1-98 Test Method RE-2. Use the current edition of ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
c. MRC Loss Prevention Data Sheet 1-49 “Perimeter Flashing.” The fascia product shall be listed in current Factory Mutual Research Corporation Approval Guide.

2. Basis of Design Products:
   a. SecurEdge 300 Fascia System: a snap-on edge system consisting of an a 24 gauge galvanized steel waterdam. Metal fascia shall be .050 aluminum and the color shall be a standard Kynar color or as noted on drawings.The required metal edge detail for this project shall be Carlisle Detail U-1B.1.
   b. Termination Bar: a 1 inch wide and .098 inch thick extruded aluminum bar pre-punched 6 inches on center; incorporates a sealant ledge to support Lap Sealant and provide increased stability for membrane terminations. The required metal edge detail for this project shall be Carlisle Detail U-9A.
   c. Wood blocking to be installed as per FM 1-49.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set.

3.02 PREPARATION - GENERAL

A. Clean substrate thoroughly prior to roof application.

B. Apply manufacturer's recommended vapor retarder or temporary roof before roof installation.

3.03 INSTALLATION - GENERAL

A. Perform work in accordance with manufacturer's instructions.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

3.04 VAPOR RETARDER INSTALLATION

A. Apply vapor retarder to deck surface with adhesive in accordance with manufacturer's instructions.

1. Surfaces to receive Carlisle 725 TR Air and Vapor Barrier must be clean and dry. Blow off and broom off any loose debris. Prime all surfaces to receive the vapor retarder with a NYS VOC OTC compliant primer, Low VOC Cav-Grip. Apply the primer with a long nap roller at the applicable coverage rate noted above. At 75° F allow primer to dry 1 hour minimum. If the Cav-Grip is being used; spray apply in a thin even coat at a rate of 2,000 - 2,500 square feet per cylinder. Apply Cav-Grip in a thin, even coat to substrate. Avoid high thickness buildup. Keep spray gun perpendicular to surface during spray. Set time for the Cav-Grip should be approximately 5 minutes. Primers have a satisfactory cure when it will not transfer when touched. Prime only areas to be waterproofed the same day. Reprime if area becomes dirty. Apply Carlisle 725TR Air and Vapor Barrier from low to high point, in a shingle fashion, so that laps will shed water. Overlap all edges at lease 2-1/2 inches. End laps shall be staggered. Place membrane carefully so as to avoid wrinkles and fishmouths. Immediately after installation, roll with a 100-150 pound weighted steel roller. There shall be no gaps in the vapor barrier application.

2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.

B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.

3.05 INSULATION APPLICATION

A. Attachment of Insulation: Embed insulation in adhesive in full contact, in accordance with roofing and insulation manufacturer's instructions. Ribbon method adhesives are acceptable. Bead spacing shall be 4” on center in the field, perimeter and corners. Strict care must be taken to ensure that all insulation boards lay flat and are in an even plane with adjacent boards.

B. Lay subsequent layers of insulation with joints staggered minimum 6 inches from joints of preceding layer.

C. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

D. Lay boards with edges in moderate contact without forcing, and gap between boards no greater than 1/4 inch. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

E. At roof drains, use factory-tapered boards to slope down to roof drains over 24 inches.

F. Do not apply more insulation than can be completely waterproofed in the same day.

3.06 MEMBRANE APPLICATION

A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.

B. Shingle joints on sloped substrate in direction of drainage.

C. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches. Seal permanently waterproof.

D. At intersections with vertical surfaces:

1. Extend membrane up a minimum of 4 inches onto vertical surfaces.

2. Fully adhere flexible flashing over membrane and up to nailing strips.

E. Coordinate installation of roof drains and sumps and related flashings, locate field splices away from low areas and roof drains, and lap upslope sheet over downslope sheet.

F. Daily Seal: Install daily seal per manufacturer's instructions at the end of each workday. Prevent infiltration of water at incomplete flashings, terminations, and at unfinished membrane edges.

3.07 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Remove wrappings, empty containers, paper, and other debris from the roof daily. Dispose of debris in compliance with local, State, and Federal regulations.

C. Remove bituminous markings from finished surfaces.

D. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

E. Repair or replace defaced or damaged finishes caused by work of this section.

3.08 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings and counterflashings.

B. Sealants for joints within sheet metal fabrications.

1.02 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).

F. CDA A4050 - Copper in Architecture - Handbook; current edition.

G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Maintain one copy of each document on site.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

A. Anodized Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 16 gauge, 0.050 inch thick; clear anodized finish.

1. Clear Anodized Finish: AAMA 611, AA-M12C22A41, Class I, clear anodic coating not less than 0.7 mil, 0.0007 inch thick.

B. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 20 gauge, 0.036 inch thick; smooth No. 4 - Brushed finish.

2.02 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet, minimum 3 inches wide, interlocking with sheet.

C. Form pieces in longest possible lengths.

D. Hem exposed edges on underside 1/2 inch; miter and seam corners.

E. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

F. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.

G. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.03 FLASHING

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.04 ACCESSORIES

A. Fasteners: Stainless steel, with soft neoprene washers.

B. Primer Type: Zinc chromate.

C. Concealed Sealants: Non-curing butyl sealant.

D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

E. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

F. Reglets: Recessed type, galvanized steel; face and ends covered with plastic tape.

PART 3 EXECUTION

3.01 INSTALLATION

A. Insert flashings into reglets to form tight fit; secure in place with plastic wedges; seal flashings into reglets with sealant.

B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

C. Apply plastic cement compound between metal flashings and felt flashings.

D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

E. Seal metal joints watertight.

END OF SECTION

SECTION 07 72 00

ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof hatches.

2. Roof hatch accessories.

B. Related Requirements:

1. Section 055213 "Pipe and Tube Railings" for safety railing systems not attached to roof-hatch curbs.

1.2 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 ROOF HATCHES

A. Roof Hatches: Metal roof-hatch units with lids and insulated **double**-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, **straight sides,** and integrally formed deck-mounting flange at perimeter bottom.

1. Basis of Design:
   a. The Bilco Company; type S-50TB: www.bilco.com
   b. Substitutions: See Section 01 60 00 – Product Requirements. Type and Size: Single-leaf lid, Sized to match existing roof hatch opening.

B. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

C. Hatch Material: Aluminum-zinc alloy-coated steel sheet.

1. Thickness: Manufacturer's standard thickness for hatch size indicated First option in "Finish" Subparagraph below applies only to zinc-coated (galvanized) steel sheet.

2. Finish: Two-coat fluoropolymer.

3. Color: As selected by Architect from manufacturer's full range.

D. Construction:

1. Insulation: 2-inch- (50-mm-) thick, polyisocyanurate board.
   a. R-Value: 12.0 according to ASTM C1363.

2. Nailer: Factory-installed wood nailer continuous around hatch perimeter.

3. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.

4. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.

5. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.

6. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is tapered to accommodate roof slope so that top surfaces of perimeter curb are level. Equip hatch with water diverter or cricket on side that obstructs water flow.

E. Hardware: Spring operators, hold-open arm, galvanized steel spring latch with turn handles, **galvanized** steel butt- or pintle-type hinge system, and padlock hasps inside and outside.

2.3 ROOF HATCH ACCESSORIES

A. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to existing roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

1. Basis of Design: The Bilco Company; Bil-Guard 2.0: www.bilco.com

2. Height: 42 inches above finished roof deck.

3. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches in diameter or galvanized-steel tube, 1-5/8 inches in diameter.

4. Flat Bar: Galvanized steel, 2 inches high by 3/8 inch thick.

5. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches in diameter.

6. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.

7. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.

8. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.

9. Fabricate joints exposed to weather to be watertight.

10. Fasteners: Manufacturer's standard, finished to match railing system. Finish: Manufacturer's standard.
    a. Color: As selected by Architect from manufacturer's full range.

B. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.

1. Basis of Design: The Bilco Company; LU-1: www.bilco.com

2. Operation: Post locks in place on full extension; release mechanism returns post to closed position.

3. Height: 42 inches above finished roof deck.

4. Material: Steel tube.

5. Finish: Manufacturer's standard baked enamel or powder coat.
   a. Color: As selected by Architect from manufacturer's full range.

2.4 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation.

1. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.

2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

B. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.

C. Steel Tube: ASTM A500/A500M, round tube.

D. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.

E. Steel Pipe: ASTM A53/A53M, galvanized.

2.5 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

C. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

D. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

G. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.

2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.

3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.

4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof-Hatch Installation:

1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.

2. Attach safety railing system to roof-hatch curb.

3. Attach ladder-assist post according to manufacturer's written instructions.

D. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions.

B. Clean off excess sealants.

C. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

1.02 REFERENCE STANDARDS

A. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

C. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.

D. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015 (Reapproved 2019).

E. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2023a.

F. ITS (DIR) - Directory of Listed Products; Current Edition.

G. FM 4991 - Approval Standard of Firestop Contractors; 2013.

H. FM (AG) - FM Approval Guide; Current Edition.

I. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.

J. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

K. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance ratings, and limitations.

C. Manufacturer's qualification statement.

D. Installer's qualification statement.

1.04 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.

1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.

2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:

1. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:

2. Verification of minimum three years documented experience installing work of this type.

3. Verification of at least five satisfactorily completed projects of comparable size and type.

4. Licensed by local authorities having jurisdiction (AHJ).

1.05 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping Manufacturers:

1. 3M Fire Protection Products: www.3m.com/firestop/#sle.

2. CEMCO: www.cemcosteel.com/#sle.

3. Hilti, Inc: www.hilti.com/#sle.

4. MarinoWARE: www.marinoware.com/#sle.

5. RectorSeal, a CSW Industrials Company: www.rectorseal.com/firestop-solutions/#sle.

6. Specified Technologies Inc: www.stifirestop.com/#sle.

7. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

8. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

C. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.

B. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.

C. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

D. Acoustically Rated Firestopping: Provide system tested in accordance with ASTM E90 with STC rating of 50, minimum.

2.04 FIRESTOPPING FOR FLOOR-TO-FLOOR, FLOOR-TO-WALL, HEAD-OF-WALL, AND WALL-TO-WALL JOINTS

A. Concrete and Concrete Masonry Walls and Floors:

1. Head-of-Wall Joints at Concrete/Concrete Masonry Wall to Concrete Floor:
   a. 2 Hour Construction: UL System HW-D-0268; Hilti CP 606 Flexible Firestop Sealant.
   b. 2 Hour Construction: UL System HW-D-0312; Specified Technologies Inc. SIL Silicone Sealant.

2. Concrete/Concrete Masonry Wall-to-Wall Joint Systems That Have Movement Capabilities (Dynamic-D):
    a. 2 Hour Construction: UL System WW-D-0025; RectorSeal MetaCaulk 1200 Spray.
    b. 2 Hour Construction: UL System WW-D-0027; RectorSeal MetaCaulk 150+.
    c. 2 Hour Construction: UL System WW-D-0110; RectorSeal MetaCaulk 150+.
    d. 2 Hour Construction: UL System WW-D-1077; Tremco, TREMstop Acrylic Firestop Sealant.
    e. 2 Hour Construction: UL System WW-D-0017; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
    f. 2 Hour Construction: UL System WW-D-0032; Hilti CP 606 Flexible Firestop Sealant.

2.05 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

A. Blank Openings:

1. In Floors or Walls:
    a. 2 Hour Construction: UL System C-AJ-0090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
    b. 2 Hour Construction: UL System C-AJ-0015; Specified Technologies Inc. SSM Mortar.
    c. 2 Hour Construction: UL System C-AJ-0116; Specified Technologies Inc. Composite Sheet.
    d. 2 Hour Construction: UL System C-AJ-0136; Specified Technologies Inc. SSM Mortar.

B. Penetrations Through Floors or Walls By:

1. Multiple Penetrations in Large Openings:
    a. 2 Hour Construction: UL System C-AJ-8143; Hilti FS-ONE MAX Intumescent Firestop Sealant.
    b. 2 Hour Construction: UL System C-AJ-8035; Specified Technologies Inc. SSM Mortar.
    c. 2 Hour Construction: UL System C-AJ-8042; RectorSeal MetaCaulk 1000.
    d. 2 Hour Construction: UL System C-AJ-8055; Specified Technologies Inc. SSP Firestop Putty.
    e. 2 Hour Construction: UL System C-AJ-8093; Specified Technologies Inc. SSB Intumescent Firestop Pillows.
    f. 2 Hour Construction: UL System C-AJ-8114; Specified Technologies Inc. SSM Mortar.
    g. 2 Hour Construction: UL System C-AJ-8115; Specified Technologies Inc. SSM Mortar.
    h. 2 Hour Construction: UL System C-AJ-8129; RectorSeal MetaCaulk 1200 Spray.
    i. 2 Hour Construction: UL System C-AJ-8149; RectorSeal MetaCaulk 1000.
    j. 2 Hour Construction: UL System C-AJ-8171; RectorSeal MetaCaulk Wrap Strip.
    k. 2 Hour Construction: UL System C-AJ-8181; Specified Technologies Inc. Composite Sheet.
    l. 2 Hour Construction: UL System C-AJ-8220; Specified Technologies Inc. SSM Mortar.

2. Uninsulated Metallic Pipe, Conduit, and Tubing:
   a. 2 Hour Construction: UL System C-AJ-1036; RectorSeal MetaCaulk 950.
   b. 2 Hour Construction: UL System C-AJ-1090; Specified Technologies Inc. SSP Firestop Putty.
   c. 2 Hour Construction: UL System C-AJ-1186; RectorSeal MetaCaulk 950.
   d. 2 Hour Construction: UL System C-AJ-1198; Specified Technologies Inc. SIL Silicone Sealant.
   e. 2 Hour Construction: UL System C-AJ-1226; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   f. 2 Hour Construction: UL System C-AJ-1240; Specified Technologies Inc. LC Endothermic Firestop Sealant.
   g. 2 Hour Construction: UL System C-AJ-1425; Hilti CFS-S SIL GG Firestop Silicone Sealant Gun-Grade.
   h. 1 Hour Construction: UL System C-AJ-1039; RectorSeal MetaCaulk 950.

3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
   a. 2 Hour Construction: UL System C-AJ-2047; RectorSeal MetaCaulk 1000.
   b. 2 Hour Construction: UL System C-AJ-2167; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   c. 2 Hour Construction: UL System C-AJ-2109; Hilti CP 643N/644 Firestop Collar.
   d. 2 Hour Construction: UL System C-AJ-2106; Specified Technologies Inc. SSW Wrap Strips.
   e. 2 Hour Construction: UL System C-AJ-2282; Specified Technologies Inc. SSW Wrap Strips.
   f. 2 Hour Construction: UL System C-AJ-2297; Specified Technologies Inc. SSC Collars.
   g. 2 Hour Construction: UL System C-AJ-2297; Specified Technologies Inc. SSW Wrap Strips.
   h. 2 Hour Construction: UL System C-AJ-2298; Specified Technologies Inc. LCC Intumescent Firestop Collars.
   i. 2 Hour Construction: UL System C-AJ-2348; RectorSeal MetaCaulk 150+.
   j. 2 Hour Construction: UL System C-AJ-2588; Specified Technologies Inc. RTC Range-Taking Collar.
   k. 2 Hour Construction: UL System C-AJ-2707; RectorSeal MetaCaulk 1000.
   l. 2 Hour Construction: UL System C-AJ-2772; Specified Technologies Inc. SSW Wrap Strips.
   m. 2 Hour Construction: UL System C-BJ-2021; Hilti CP 643N Firestop Collar.

4. Electrical Cables Not In Conduit:
   a. 2 Hour Construction: UL System C-AJ-3213; Specified Technologies Inc. LCC Intumescent Firestop Collars.
   b. 2 Hour Construction: UL System C-AJ-3213; Specified Technologies Inc. SSC Collars.
   c. 2 Hour Construction: UL System W-J-3046; Specified Technologies Inc. SSP Firestop Putty.
   d. 2 Hour Construction: UL System C-AJ-3154; Specified Technologies Inc. SSP Firestop Putty.
   e. 2 Hour Construction: UL System C-AJ-3216; Hilti CFS-PL Firestop Plug.
   f. 2 Hour Construction: UL System C-AJ-3283; Hilti CP653 Speed Sleeve.
   g. 2 Hour Construction: UL System C-AJ-3283; Hilti CFS-SL SK Firestop Sleeve Kit.
   h. 2 Hour Construction: UL System C-AJ-3283; Hilti CFS-SL SK Firestop Sleeve Kit with Hilti CFS-SL GP Gangplate.

i. 2 Hour Construction: UL System W-J-3198; Hilti CFS-SL RK Retrofit Sleeve Kit for Existing Cables.
j. 2 Hour Construction: UL System W-J-3199; Hilti CFS-SL SK Firestop Sleeve Kit.
k. 2 Hour Construction: UL System F-A-3085, F-A-3087, F-A-3088, W-J-3277, W-J-3278, W-J-3279, W-L-3481, W-L-3482, W-L-3483, and W-L-3484.; Hilti CFS-MSL L Modular Sleeve.

5. Cable Trays with Electrical Cables:
   a. 2 Hour Construction: UL System C-AJ-4094; Hilti CFS-BL Firestop Block.

6. Insulated Pipes:
   a. 2 Hour Construction: UL System C-AJ-5048; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CP 601S Elastomeric Firestop Sealant, CP 604 Self-Leveling Firestop Sealant or CFS-S SIL GG Firestop Silicone Sealant Gun-Grade.
   b. 2 Hour Construction: UL System C-AJ-5087; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
   c. 2 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE IMAX Intumescent Firestop Sealant.
   d. 2 Hour Construction: UL System C-AJ-5138; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
   e. 2 Hour Construction: UL System C-AJ-5313; Specified Technologies Inc. LC Endothermic Firestop Sealant.

7. HVAC Ducts, Uninsulated:
   a. 2 Hour Construction: UL System C-AJ-7111; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.06 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.

1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Install labeling required by code.

3.04 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

D. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.

2. List of backing materials approved for use with the specific product.

3. Backing material recommended by sealant manufacturer.

4. Substrates that product is known to satisfactorily adhere to and with which it is compatible.

5. Substrates the product should not be used on.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. Manufacturer's qualification statement.

F. Installer's qualification statement.

G. Executed warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Nonsag Sealants:

1. Dow: www.dow.com/#sle.

2. Henry Company: www.henry.com/#sle.

3. Hilti, Inc: www.hilti.com/#sle.

4. Pecora Corporation: www.pecora.com/#sle.

5. Sika Corporation: www.usa.sika.com/#sle.

6. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

7. W. R. Meadows, Inc: www.wrmeadows.com/#sle.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints:
   a. Do not seal exterior joints unless indicated on drawings as sealed.

2. Interior Joints:
   a. Seal the following joints:
      1) Joints between door frames and window frames and adjacent construction.
      2) In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, and piping penetrations.
      3) In sound-rated wall and ceiling assemblies, seal joints between wall assemblies and ceiling assemblies; between wall assemblies and other construction; between ceiling assemblies and other construction.

3. Do Not Seal:
   a. Intentional weep holes in masonry.
   b. Joints indicated to be covered with expansion joint cover assemblies.
   c. Joints where sealant installation is specified in other sections.

B. Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.

C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.

1. Joints between Tile in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.

D. Interior Wet Areas: Bathrooms and restrooms; fixtures in wet areas include plumbing fixtures, countertops, and other similar items.

2.03 JOINT SEALANTS – GENERAL

A. Sealants and Primers: Provide products with acceptable levels of Volatile Organic Compound (VOC) content – see Section 01 61 16.

2.04 NONSAG JOINT SEALANTS

A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 50 percent, minimum.

2. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.

3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.

4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.

5. Color: To be selected by Architect from manufacturer's standard range.

B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.

1. Color: White.

C. Tamper-Resistant, Silyl-Terminated Polyether (STPE) and Polyurethane (STPU) Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 50 percent, minimum

2. Hardness Range: 25 to 30, Shore A, when tested in accordance with ASTM C661.

3. Color: To be selected by Architect from manufacturer's standard range.

D. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 50 percent, minimum.

2.05 ACCESSORIES

A. Sealant Backing Materials, General: Materials placed in joint before applying sealants; assists sealant performance and service life by developing optimum sealant profile and preventing three-sided adhesion; type and size recommended by sealant manufacturer for compatibility with sealant, substrate, and application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.

D. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:

1. Width/depth ratio of 2:1.

2. Neck dimension no greater than 1/3 of the joint width.

3. Surface bond area on each side not less than 75 percent of joint width.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

DIVISION 08 - OPENINGS

SECTION 08 06 71

DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section references specification sections relating to commercial door hardware for the following:

1. Swinging doors.

2. Sliding Doors.

3. Other doors to the extent indicated.

B. Commercial door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.

2. Electromechanical and access control door hardware.

3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.

4. Automatic operators.

5. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware”.

2. Division 28 Section “Access Control Hardware Devices”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

2. ICC/IBC - International Building Code.

3. NFPA 70 - National Electrical Code.

4. NFPA 80 - Fire Doors and Windows.

5. NFPA 101 - Life Safety Code.

6. NFPA 105 - Installation of Smoke Door Assemblies.

7. State Building Codes, Local Amendments.

E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.

d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.6 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Refer to “PART 3 – EXECUTION” for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.

1. Section 08 71 00 – Door Hardware.

2. Section 28 15 00 – Access Control Hardware Devices.

C. Manufacturer's Abbreviations:

1. Mk – McKinney

2. PE – Pemko

3. SU – Securitron

4. SA – SARGENT

5. RO - Rockwood

Hardware Sets

Set: 1.0

Doors: 100, 101.1, 110c

1 Continuous Hinge	CFM_SLF-HD1 PT x Length Required		PE	087100	
1 Electric Power Transfer	EL-CEPT	630	SU	087100	
1 Rim Exit Device	11727P 16 56-SN200-PE8804 FSL	US32D	SA	281500	
1 Core	Type/qty as required	US15	SA	087100	
1 Surface Closer	281 CPS	EN	SA	087100	
1 Rain Guard	346C (Omit at overhangs)		PE	087100	
1 Sweep	3452CNB x Length Required		PE	087100	
1 Threshold	273x224AFGT x Length Required		PE	087100	

	x MSES25SS			
1 ElectroLynx Harness - Frame	QC-C1500P		MK	087100
1 ElectroLynx Harness - Door	QC-CXXX (Size as required)		MK	087100
1 Position Switch	DPS - M/W		SU	087100
1 Power Supply	AQL4-R8E1 x Relays as Required		SU	087100

Notes: Door closed & locked at all times. Presenting valid credential outside shunts door position switches & allows for authorized entrance. Operating inside trim activates request to exit switch shunting door contact and allowing authorized egress at all times. With loss of power door remains locked.

Set: 2.0

Doors: 109a, 110

1 Continuous Hinge	CFM_SLF-HD1-M x Length Required		PE	087100
1 Rim Exit Device, Storeroom	11727P 16 PE8804 FSL	US32D	SA	087100
1 Core	Type/qty as required	US15	SA	087100
1 Surface Closer	281 CPS	EN	SA	087100
1 Rain Guard	346C (Omit at overhangs)		PE	087100
1 Sweep	3452CNB x Length Required		PE	087100
1 Threshold	273x224AFGT x Length Required x MSES25SS		PE	087100

Set: 3.0

Doors: 109

3 Hinge, Full Mortise	TA2714 [NRP] FT	US26D	MK	087100
1 Rim Exit Device, Storeroom	11727P 12 PE8804 NEL	US32D	SA	087100
1 Core	Type/qty as required	US15	SA	087100
1 Concealed Overhead Stop	690S (Size to opening)	EN	SA	087100
1 Wall Stop	RM860/RM861 (As Required)	US26D	RO	087100
1 Gasketing	S88BL (Head & Jambs)		PE	087100

Set: 4.0

Doors: 104

3 Hinge, Full Mortise	TA2714 [NRP] FT	US26D	MK	087100
1 Storeroom/Closet Lock	11727P 8204 LNL	US26D	SA	087100
1 Core	Type/qty as required	US15	SA	087100
1 Concealed Overhead Stop	690S (Size to opening)	EN	SA	087100
3 Silencer	608		RO	087100

Set: 5.0

Doors: 103

3 Hinge, Full Mortise	TA2714 [NRP] FT	US26D	MK	087100
1 Storeroom/Closet Lock	11727P 8204 LNL	US26D	SA	087100
1 Core	Type/qty as required	US15	SA	087100
1 Surface Closer	351 O/P3 (Arm to suit)	EN	SA	087100
1 Wall Stop	RM860/RM861 (As Required)	US26D	RO	087100
1 Gasketing	S88BL (Head & Jambs)		PE	087100

Set: 6.0

Doors: 102

3 Hinge, Full Mortise	TA2714 [NRP] FT	US26D	MK	087100
1 Office/Entry Lock	11727P 8205 LNL	US26D	SA	087100
1 Core	Type/qty as required	US15	SA	087100
1 Wall Stop	RM860/RM861 (As Required)	US26D	RO	087100
3 Silencer	608		RO	087100

Set: 7.0

Doors: 101

3 Hinge, Full Mortise	TA2714 [NRP] FT	US26D	MK	087100
1 Office/Entry Lock	11727P 8205 LNL	US26D	SA	087100
1 Core	Type/qty as required	US15	SA	087100
1 Concealed Overhead Stop	690S (Size to opening)	EN	SA	087100
3 Silencer	608		RO	087100

Set: 8.0

Doors: 108a

3 Hinge, Full Mortise	TA2714 [NRP] FT	US26D	MK	087100
1 Office/Entry Lock	11727P 8205 LNL	US26D	SA	087100
1 Core	Type/qty as required	US15	SA	087100
1 Surface Closer	351 O/P3 (Arm to suit)	EN	SA	087100
1 Wall Stop	RM860/RM861 (As Required)	US26D	RO	087100
1 Gasketing	S88BL (Head & Jambs)		PE	087100

Set: 9.0

Doors: 101a, 108

3 Hinge, Full Mortise	TA2714 [NRP] FT	US26D	MK	087100
1 Office/Entry Lock	11727P 8205 LNL	US26D	SA	087100
1 Core	Type/qty as required	US15	SA	087100
1 Concealed Overhead Stop	690S (Size to opening)	EN	SA	087100
1 Surface Closer	351 O/P3 (Arm to suit)	EN	SA	087100
1 Gasketing	S88BL (Head & Jambs)		PE	087100

Set: 10.0

Doors: 106, 107

3 Hinge, Full Mortise	TA2714 [NRP] FT	US26D	MK	087100
1 Institutional Privacy Lock	11727P LB V21 8267 LNL	US26D	SA	087100
1 Core	Type/qty as required	US15	SA	087100
1 Concealed Overhead Stop	690S (Size to opening)	EN	SA	087100
3 Silencer	608		RO	087100

Set: 11.0

Doors: 101.1a, 105

3 Hinge, Full Mortise	TA2714 [NRP] FT	US26D	MK	087100
1 Passage Latch	8215 LNL	US26D	SA	087100
1 Surface Closer	351 O/P3 (Arm to suit)	EN	SA	087100
1 Wall Stop	RM860/RM861 (As Required)	US26D	RO	087100
1 Gasketing	S88BL (Head & Jambs)		PE	087100

Set: 12.0

Doors: 105a

3 Hinge, Full Mortise	TA2714 [NRP] FT	US26D	MK	087100
1 Passage Latch	8215 LNL	US26D	SA	087100
1 Concealed Overhead Stop	690S (Size to opening)	EN	SA	087100
1 Surface Closer	351 O/P3 (Arm to suit)	EN	SA	087100
1 Wall Stop	RM860/RM861 (As Required)	US26D	RO	087100

Set: 13.0

Doors: 100a, 100b, 100c, 100d, 110a, 110b

1 Core	Type/qty as required	US15	SA	087100
1 Cylinder	As Required x Temp Core	US32D	SA	087100

Notes: Balance of hardware by assembly manufacturer.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hollow metal frames for wood doors.

B. Fire-rated hollow metal doors and frames.

C. Hollow metal borrowed lites glazing frames.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

I. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

J. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.

K. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

L. ITS (DIR) - Directory of Listed Products; Current Edition.

M. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

N. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

O. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2024.

P. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

Q. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

R. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

S. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.

T. UL (DIR) - Online Certifications Directory; Current Edition.

U. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: https://steeldoor.org/sdi-certified/#sle.

B. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:

1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.

2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.

3. Premier Steel Doors and Frames: www.trustpremier.com/#sle.

4. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.

5. Steelcraft, an Allegion brand: www.allegion.com/#sle.

6. Pioneer Industries.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:

1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.

2. Accessibility: Comply with ICC A117.1 and ADA Standards.

3. Door Edge Profile: Manufacturers standard for application indicated.

4. Typical Door Face Sheets: Flush.

5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.

6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Fire-Rated Doors:

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
   a. Level 2 - Heavy-duty.
   b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
   c. Model 1 - Full Flush.
   d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.

2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").

3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
   a. Attach fire rating label to each fire rated unit.

4. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.

5. Door Thickness: 1-3/4 inches, nominal.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. Door Frames, Fire-Rated: Full profile/continuously welded type.

1. Fire Rating: Same as door, labeled.

2. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.

D. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

E. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

F. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

G. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.

H. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

A. Glazing: As specified in Section 08 80 00, factory installed.

B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

C. Astragals for Double Doors: Specified in Section 08 71 00.

D. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

F. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Install door hardware as specified in Section 08 71 00.

F. Comply with glazing installation requirements of Section 08 80 00.

G. Coordinate installation of electrical connections to electrical hardware items.

H. Touch up damaged factory finishes.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08 11 16

ALUMINUM DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush aluminum doors with fiberglass reinforced plastic (FRP) face sheets.

B. Aluminum frames.

C. Flush door panels.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between door frames and adjacent construction.

B. Section 08 71 00 - Door Hardware: Hardware for aluminum doors.

C. Section 08 80 00 - Glazing: Glazing materials for aluminum doors and frames.

1.03 REFERENCE STANDARDS

A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

B. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.

C. AAMA 701/702 - Performance Specification for Pile Weatherstrips (AAMA 701) and Polymer Weatherseals (AAMA 702); 2023.

D. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

F. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's descriptive literature for each type of door; include information on fabrication methods.

C. Shop Drawings: Include elevations of each opening type.

1. Verify dimensions by field measurements before fabrication and indicate on shop drawings.

D. Selection Samples: Complete set of color and finish options, using actual materials, for Architect's selection.

E. Manufacturer's qualification statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver aluminum components in manufacturer's standard protective packaging, palleted, crated, or banded together.

B. Inspect delivered components for damage and replace. Repaired components will not be accepted.

C. Store components in clean, dry, indoor area, under cover in manufacturer's packaging until installation.

D. Protect materials and finish from damage during handling and installation.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 10-year manufacturer warranty for defects in workmanship and materials. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Flush Aluminum Doors with Fiberglass Reinforced Plastic (FRP) Face Sheets:

1. Cline Aluminum Doors, Inc; Series 200BE (FRP Facer): www.clinedoors.com/#sle.

2. Special-Lite, Inc; SL-17: www.special-lite.com/#sle.

3. FRP Architectural Doors, Inc.: FD55; www.frparch.com .

4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Aluminum Frames:

1. Arcadia, Inc: www.arcadiainc.com/#sle.

2. Cline Aluminum Doors, Inc: www.clinedoors.com/#sle.

3. EFCO Corporation: www.efcocorp,com.

4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOORS AND FRAMES

A. Accessibility: Comply with ICC A117.1 and ADA Standards.

B. Flush Aluminum Doors with Fiberglass Reinforced Plastic (FRP) Face Sheets: Aluminum internal framing; no steel components.

1. Thickness: 1-3/4 inches.

2. Aluminum Finish: Class I - Natural anodized.

3. Facing: Seamless, ultraviolet stabilized laminated FRP sheet.
   a. Sheet Thickness: 0.12 inch, minimum.
   b. Texture - FRP: Pebble grain.
   c. Surface Burning Characteristics: Flame spread index (FSI) of 0 to 25, Class A, and smoke developed index (SDI) of 450 or less; when tested in accordance with ASTM E84.
   d. Color: As selected by Architect from manufacturer's standard line.

4. Core: Poured-in-place polyurethane foam.
   a. Foam Plastic Insulated Doors: IBC 2603.4.
      1) Foam plastic shall be separated from the interior of a building by an approved thermal barrier.
      2) Approved thermal barrier must meet the acceptance criteria of the Temperature Transmission Fire Test and Integrity Fire Test as stated in NFPA 275.

3) IBC 2603.4.1.7 foam plastic insulation, having a flame spread index less than 75 and a smoke developed index of not more than 450 shall be permitted as a door core when the face is metal minimum 0.032" aluminum or 0.016" steel.
4) Standard door assembly can be tested to show it meets these requirements without the use of thermal barrier. If no independent testing conducted all doors with foam plastic core must have a thermal barrier.

C. Aluminum Frames for Doors, Sidelights, or Transoms: Extruded aluminum, non-thermally broken hollow or C-shaped sections; no steel components.

1. Frame Depth: 4-1/4 inches, unless noted otherwise on drawings.

2. Finish: Class I - Natural anodized.

3. Weatherstripping: Replaceable pile type; at jambs and head.

D. Dimensions and Shapes: As indicated on drawings; dimensions indicated are nominal.

1. Provide vision lites as indicated on drawings.

2. Provide the following clearances:
   a. Hinge and Lock Stiles: 1/8 inch.
   b. Between Meeting Stiles: 1/4 inch.
   c. At Top Rail and Bottom Rail: 1/8 inch.

2.03 COMPONENTS

A. Flush Door Panels: Without visible seams on face sheet.

1. Framing and Hardware Backup: Extruded aluminum tubing, 1/8 inch minimum thickness.

2. Perimeter Edges: Extruded aluminum cap.

3. Laminating Adhesive: Manufacturer's standard low-VOC materials.

B. Frames: Extruded aluminum shapes, not less than 0.062 inch thick, reinforced at hinge and strike locations.

1. Corner Brackets: Extruded aluminum, fastened with stainless steel screws.

2. Trim: Extruded aluminum, not less than 0.062 inch thick, removable snap-in type without exposed fasteners.

C. Vision Lites: Extruded aluminum framed, gasket glazed.

1. Glazing: See Section 08 80 00.

D. Additional Door Hardware: See Section 08 71 00.

E. Replaceable Weatherstripping: AAMA 701/702 wool pile.

2.04 MATERIALS

A. Aluminum Sheet: ASTM B209/B209M, alloy 5005, temper H14, stretcher leveled.

B. Extruded Aluminum: ASTM B221 (ASTM B221M), alloy 6063, temper T5, or alloy 6463, temper T5.

2.05 FINISHES

A. Class I Natural Anodized Finish: Clear anodic coating; AAMA 611 AA-M12C22A41, minimum dry film thickness (DFT) of 0.7 mils, 0.0007 inch.

B. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.06 ACCESSORIES

A. Fasteners: Aluminum, non-magnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.

B. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, non-magnetic stainless steel or steel hot-dip galvanized in compliance with ASTM A123/A123M.

C. Bituminous Coating: Cold-applied asphaltic mastic, compounded for 30-mil thickness per coat.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.

3.02 PREPARATION

A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions.

B. Replace components with damage to exposed finishes.

C. Separate dissimilar metals to prevent electrolytic action between metals.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings.

B. Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations and within specified tolerances.

C. Where aluminum surfaces contact metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by painting dissimilar metal with heavy coating of bituminous paint.

D. Hang doors and adjust hardware to achieve specified clearances and proper door operation.

E. Install door hardware. See Section 08 71 00.

F. Comply with glazing installation requirements. See Section 08 80 00.

3.04 CLEANING

A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609 & 610.

B. Do not use abrasive, caustic, or acid cleaning agents.

3.05 PROTECTION

A. Protect products of this section from damage caused by subsequent construction until Date of Substantial Completion.

B. Replace damaged or defective components that cannot be repaired to a condition indistinguishable from undamaged components.

END OF SECTION

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration; fire-rated and non-rated.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames.

B. Section 08 71 00 - Door Hardware.

1.03 REFERENCE STANDARDS

A. AWI (QCP) - Quality Certification Program; Current Edition.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

E. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

D. Samples: Submit two samples of door veneer, 4 by 4 inches in size illustrating wood grain, stain color, and sheen.

E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Specimen warranty.

I. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.

1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

D. Woodwork Quality Assurance Program:

1. Comply with AWI (QCP) woodwork association quality assurance service/program in accordance with requirements for work specified in this section; www.awiqcp.org/#sle.

2. Provide labels indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.

3. Provide designated labels on shop drawings as required by quality assurance program.

4. Provide designated labels on installed products as required by quality assurance program.

5. Submit documentation upon completion of installation that verifies this work is in compliance with specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging, and inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.

1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:

1. Masonite Architectural: www.architectural.masonite.com/#sle.

2. VT Industries, Inc: www.vtindustries.com/#sle.

3. Eggers Industries: www.eggersindustries.com.

4. Graham Wood Doors: www.grahamdoors.com.

5. Marshfield Door Systems, Inc: www.marshfielddoors.com.

6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOORS AND PANELS

A. Doors: See drawings for locations and additional requirements.

1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.

1. Provide solid core doors at each location.

2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

A. Veneer Facing for Transparent Finish: White birch, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.

1. Vertical Edges: Same species as face veneer.

2. "Running Match" each pair of doors and doors in close proximity to each other.

3. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:

1. Provide solid blocks at lock edge for hardware reinforcement.

2. Provide solid blocking for other throughbolted hardware.

C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

E. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:

B. Factory finish doors in accordance with approved sample.

2.07 ACCESSORIES

A. Hollow Metal Door Frames: See Section 08 11 13.

B. Door Hardware: See Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

A. Comply with specified quality standard for fit and clearance tolerances.

B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

END OF SECTION

SECTION 08 36 13

SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Overhead sectional doors, electrically operated.

B. Operating hardware and supports.

C. Electrical controls.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Steel channel opening frame.

B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

C. Section 08 71 00 - Door Hardware: Lock cylinders.

D. Section 26 05 33.13 - Conduit for Electrical Systems: Conduit from electric circuit to operator and from operator to control station.

E. Section 26 05 83 - Wiring Connections.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

B. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

D. DASMA 102 - American National Standard Specifications for Sectional Doors; 2018.

E. ITS (DIR) - Directory of Listed Products; Current Edition.

F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).

G. NEMA MG 1 - Motors and Generators; 2021.

H. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL (DIR) - Online Certifications Directory; Current Edition.

K. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

C. Product Data: Show component construction, anchorage method, and hardware.

D. Samples: Two panel finish samples, 4 by 4 inch in size, illustrating color and finish.

E. Manufacturer's qualification statement.

F. Installer's qualification statement.

G. Operation Data: Include normal operation, troubleshooting, and adjusting.

H. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

I. Specimen warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

C. Comply with applicable code for motor and motor control requirements.

D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

1.06 WARRANTY

A. Extended Correction Period: Correct defective work within a 2-year period commencing on Date of Substantial Completion.

B. Manufacturer Warranty: Provide 5-year manufacturer warranty for electric operating equipment. Complete forms in Owner's name and register with manufacturer.

C. Finish Warranty: 20-year manufacturer warranty on finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sectional Doors:

1. C.H.I. Overhead Doors; Model 3216 Micro-Grooved Sandwich Steel Insulated Doors: www.chiohd.com/#sle.

2. Clopay Building Products; Model 3724: www.clopaydoor.com/#sle.

3. Overhead Door Corporation; 598 Series Thermacore Insulated Steel Doors : www.overheaddoor.com/#sle.

4. Wayne-Dalton, a Division of Overhead Door Corporation; Thermospan 200 : www.wayne-dalton.com/#sle.

5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.

B. Air Leakage Rate: Less than 0.40 cfm/sq ft when tested in accordance with ASTM E283/E283M at test pressure difference of 1.57 psf.

C. Thermal Transmittance: U-factor of 0.31 Btu/hr sq ft degrees F, maximum, in accordance with DASMA 102.

2.03 STEEL DOORS

A. Doors: Flush steel, insulated; high lift operating style with track and hardware; complying with DASMA 102, Commercial application.

1. Door Nominal Thickness: 2 inches thick.

2. Exterior Finish:
   a. Factory finished with acrylic baked enamel; color as selected by Architect.

3. Interior Finish:
   a. Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.

4. Glazed Lites: Three glazed lights per panel, one row; set in place with resilient glazing channel.

5. Electric Operation: Electric control station.
   a. Provide emegency manual chain hoist operation.

2.04 COMPONENTS

A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.

B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.

1. For Manual Operation: Requiring maximum exertion of 25 lbs force to open.

D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.

E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.

F. Head Weatherstripping: EPDM rubber seal, one piece full length.

G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

H. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.

I. Lock Cylinders: See Section 08 71 00.

2.05 MATERIALS

A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.

B. Glazing: Refer to Section 08 80 00 - Glazing.

C. Insulation: Foamed-in-place polyurethane, bonded to facing.

2.06 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.

1. Provide interlock switches on motor operated units.

B. Electric Operators:

1. Mounting: Center mounted on cross head shaft.

2. Motor Enclosure:
   a. Exterior Doors: NEMA MG 1, Type 4; open drip proof.

3. Motor Rating: 1/2 hp; continuous duty.

4. Motor Voltage: 120 volts, single phase, 60 Hz.

5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.

6. Controller Enclosure: NEMA 250, Type 1.

7. Opening Speed: 12 inches per second.

8. Brake: Adjustable friction clutch type, activated by motor controller.

9. Manual override in case of power failure.

10. See Section 26 05 83 for electrical connections.

C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.

D. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.

1. 24 volt circuit.

2. Surface mounted, at interior door jamb.

3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
   a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.

E. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

1. Manufacturers:
   a. Miller Edge, Inc; MT-22: www.MillerEdge.com/#sle.
   b. Substitutions: See Section 01 60 00 - Product Requirements.

2. Chemically resistant: Kerosene, diesel fuel, salt, SAE 30 oil.

F. Provide interconnection to security system.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Anchor assembly to wall construction and building framing without distortion or stress.

C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

D. Fit and align door assembly including hardware.

E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.02 TOLERANCES

A. Maximum Variation from Plumb: 1/16 inch.

B. Maximum Variation from Level: 1/16 inch.

C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.

D. Maintain dimensional tolerances and alignment with adjacent work.

3.03 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping.

3.04 CLEANING

A. Clean doors and frames and glazing.

B. Remove temporary labels and visible markings.

3.05 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 51 13

ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum windows with fixed sash and operating sash.

B. Operating hardware.

C. Insect screens.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Steel lintels.

B. Section 07 25 00 - Weather Barriers: Sealing frame to water-resistive barrier installed on adjacent construction.

C. Section 07 92 00 - Joint Sealants: Sealing joints between window frames and adjacent construction.

D. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2022, with Errata (2023).

B. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.

C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

D. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.

E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

F. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Include component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.

C. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, anchorage locations, and installation requirements.

D. Samples:

1. Frames: Two samples, 2 by 4 inch in size illustrating finish.

2. Operating Hardware: Two samples of each type and finish.

E. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:

1. Evidence of AAMA Certification.

2. Evidence of WDMA Certification.

3. Evidence of CSA Certification.

4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.

F. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.

G. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

H. Manufacturer's qualification statement.

I. Installer's qualification statement.

J. Specimen warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of AAMA CW-10.

B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a ten year period after Date of Substantial Completion.

C. Manufacturer Warranty: Provide 10-year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units. Complete forms in Owner's name and register with manufacturer.

D. Manufacturer Warranty: Provide 10-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Aluminum Window Manufacturers:

1. EFCO, a Pella Company; Series SX45 Thermal Horizontal Sliding: www.efcocorp.com

2. Kawneer North America, an Arconic Company: www.kawneer.com

3. Wausau Window and Wall Systems: www.wausauwindow.com

4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ALUMINUM WINDOWS

A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.

1. Frame Depth: 3-1/2 inch.

2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.

3. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.

5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

B. Horizontal Sliding Type:

1. Construction: Thermally broken.

2. Provide screens.

3. Glazing: As specified in section 08 80 00.

4. Exterior Finish: Class I natural anodized.

5. Interior Finish: Class I natural anodized.

2.03 PERFORMANCE REQUIREMENTS

A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:

1. Performance Class (PC): AW.

2. Performance Grade (PG): 80, with minimum design pressure (DP) of 120 psf.

B. Member Deflection: Limit member deflection to 1/175 in any direction, with full recovery of glazing materials.

C. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 12.11 psf.

D. Air Leakage: 0.3 cfm/sq ft maximum leakage per unit area of outside window frame dimension when tested at 6.24 psf pressure difference in accordance with ASTM E283/E283M.

E. Condensation Resistance Factor of Frame: 60, measured in accordance with AAMA 1503.

F. Overall Thermal Transmittance (U-value): 0.43, maximum, including glazing, measured on window sizes required for this project.

2.04 COMPONENTS

A. Frames: 3-3/4 inch deep, thermally broken with interior portion of frame insulated from exterior portion.

B. Glazing: See Section 08 80 00.

C. Sills: Extruded aluminum, sloped for positive wash, one piece full width of opening.

D. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools.

1. Hardware: Spring loaded steel pins; four per screen unit.

2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.

3. Frame Finish: Same as frame and sash.

E. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to achieve effective weather seal.

F. Glazing Materials: See Section 08 80 00.

G. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

1. See Section 07 92 00 for additional requirements.

2.05 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209/B209M, 5005 alloy, H12 or H14 temper.

2.06 HARDWARE

A. Sash lock: Concealed plunger lock in the meeting rail with a flush mounted actuating handle..

B. Pulls: Manufacturer's standard type.

C. Bottom Rollers: Steel ball-bearing rollers on raised track, adjustable.

D. Limit Stops: Resilient rubber.

2.07 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41, clear anodic coating not less than 0.7 mil thick.

B. Apply one coat of bituminous coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings and adjoining water-resistive barrier materials are ready to receive aluminum windows; see Section 07 25 00.

3.02 PRIME WINDOW INSTALLATION

A. Install windows in accordance with manufacturer's instructions.

B. Install window assembly in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

C. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

D. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

E. Install sill and sill end angles.

F. Set sill members and sill flashing in continuous bead of sealant.

G. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

H. Install operating hardware not pre-installed by manufacturer.

I. Install glass and infill panels in accordance with requirements; see Section 08 80 00.

3.03 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.05 CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION

SECTION 08 56 59
SERVICE AND TELLER WINDOW UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Service and teller window units.

B. Accessories.

1.02 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

F. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2014.

G. ASTM F1233 - Standard Test Method for Security Glazing Materials And Systems; 2008 (Reapproved 2013).

H. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's product data for specified products indicating materials, operation, glazing, finishes, and installation instructions.

C. Shop Drawings: Indicate configuration, sizes, rough-in, mounting, anchors and fasteners, and installation clearances.

D. Test Data: Test reports for specific window model and glazing to be furnished, showing compliance with all specified requirements; window and glazing may be tested separately, provided window test sample adequately simulates the glazing to be used.

E. Samples for Selection of Finishes:

1. Applied Finishes: Color charts for factory finishes.

F. Installer qualification data.

G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years documented experience, with ability to provide test reports showing that their standard manufactured products meet the specified requirements.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section.

C. Testing Agency Qualifications: Independent testing agency able to show experience in conducting tests of the type specified and experienced in the type of testing specified.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver units in manufacturer's original packaging and unopened containers with identification labels intact.

B. Store units in area protected from exposure to weather and vandalism.

1.06 WARRANTY

A. See Section 01 70 00 - Execution Requirements, for additional warranty requirements.

B. Provide manufacturer's warranty agreeing to repair or replace units and their components that fail in materials or workmanship within two years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 SERVICE AND TELLER WINDOW UNITS

A. Pass-Through Window:

1. Location: Interior.

2. Forced Entry Resistance: Tested to meet ASTM F588, Grade 10 for window type and ASTM F1233, Class Achieved 1.0 for security glazing.

3. Ballistic Resistance: Tested to meet UL 752, Level 3.

4. Window: Single horizontal sliding.
   a. Operation: Manual, self-closing.
   b. Mounting: Flush with the wall surface.
   c. Size: As indicated on drawings.
   d. Counter Space Size: Manufacturer's standard size.
   e. Material: Aluminum.
   f. Finish: Pigmented coating, manufacturer's standard type.
   g. Finish Color: As selected from manufacturer's standard colors.

5. Glazing: Single (monolithic), clear.
   a. Laminated safety glazing.

6. Communication: Amplified talk-thru portal.

7. Products:
   a. C.R. Laurence Co., Inc.: Product SBRWP3 CRL Powder Painted Bullet Resistant Level 3 Manual Sliding Service Window; www.crlaurence.com.
   b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

A. Windows: Factory-fabricated, -finished, and -glazed, extruded aluminum frame and glazing stops; complete with hardware and anchors.

1. Provide window units that are re-glazable from the secure side without dismantling the non-secure side of framing.

2. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline, and weatherproof. Fully weld corners.

3. Apply factory finish to all exposed surfaces.

4. Apply bituminous paint to concealed metal surfaces in contact with cementitious or dissimilar materials.

5. Wind Design: Design and size components to withstand dead loads and live loads caused by pressure and negative wind loads acting normal to plane of window as calculated in accordance with applicable code.

6. Horizontal Sliding Windows: Top-hung operable sash; hook bolt locking device with thumb-turn release.

7. Self-Closing Operation: Manual open and self-closing with auto-locking handles and magnetic hold-open device.

2.03 MATERIALS

A. Aluminum Extrusions: Minimum 1/8 inch thick frame and sash material complying with ASTM B221 and ASTM B221M.

1. Finish: Class I clear anodized.

B. Concealed Steel Items: Galvanized in accordance with ASTM A123/A123M to thickness Grade 85, 2.0 ounces per square foot.

C. Ballistic Resistant Glazing: Laminated plastic and glass construction, with glass on both faces; complying with performance level indicated.

D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

2.04 FINISHES

A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.

B. Pigmented Organic Coating System: AAMA 2603; polyester or acrylic baked enamel finish.

C. Color: Clear Anodized.

2.05 ACCESSORIES

A. Hardware and Security Devices for Sliding Windows:

1. Auto-Lock Handle: Stainless steel auto-locking handle on all self-closing sliders to prevent intrusion.

2. Weather Stripping: Factory applied.

3. Bottom Sills: Stainless steel construction, no bottom tracks and no pop rivets.

4. Handles: Stainless steel, manufacturer's standard profile and finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that window openings are ready for installation of windows.

B. Verify that correct embedded anchors are in place and in proper location; repair or replace anchors as required to achieve satisfactory installation.

C. Notify Architect if conditions are not suitable for installation of units; do not proceed until conditions are satisfactory.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install units in correct orientation (inside/outside or secure/non-secure).

C. Anchor units securely in manner so as to achieve performance specified.

D. Set sill members and sill flashing in continuous bead of sealant.

E. Separate metal members from concrete and masonry using bituminous paint or with products recommended in writing by the manufacturer for this purpose.

3.03 ADJUSTING

A. Adjust operating components for smooth operation while also maintaining a secure, weather-tight enclosure and a tight fit at the contact points; lubricate operating hardware.

3.04 CLEANING AND PROTECTION

A. Remove protective material from factory finished surfaces.

B. Clean exposed surfaces promptly after installation without damaging finishes.

C. Remove and replace defective work.

D. Provide temporary protection to ensure that security windows are without damage upon Date of Substantial Completion.

3.05 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain operable units.

1. Instructor: Manufacturer's training personnel.

2. Location: At project site.

3. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

END OF SECTION

SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.

2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.

2. Electromechanical door hardware.

3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 06 Section “Rough Carpentry”.

2. Division 06 Section “Finish Carpentry”.

3. Division 08 Section “Hollow Metal Doors and Frames”.

4. Division 08 Section “Flush Wood Doors”.

5. Division 08 Section “Fiberglass Doors”.

6. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.

7. Division 28 Section “Access Control Hardware Devices”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

2. ICC/IBC - International Building Code.

3. NFPA 70 - National Electrical Code.

4. NFPA 80 - Fire Doors and Windows.

5. NFPA 101 - Life Safety Code.

6. NFPA 105 - Installation of Smoke Door Assemblies.

7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.

2. UL10C - Positive Pressure Fire Tests of Door Assemblies.

3. ANSI/UL 294 - Access Control System Units.

4. UL 305 - Panic Hardware.

5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.
   h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
   b. Complete (risers, point-to-point) access control system block wiring diagrams.
   c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.

2. Plans for existing and future key system expansion.

3. Requirements for key control storage and software.

4. Installation of permanent keys, cylinder cores and software.

5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.

3. Review sequence of operation narratives for each unique access controlled opening.

4. Review and finalize construction schedule and verify availability of materials.

5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.

2. Faulty operation of the hardware.

3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:
   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
   d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
   a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
   b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
   b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:
   a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.

5. Manufacturers:
   a. McKinney (MK) - TA/T4A Series, 5-knuckle.
   b. Or Approved Equal.

2.2 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

   1. Manufacturers:
      a. Pemko (PE).
      b. Or Approved Equal.

2.3 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

   1. Manufacturers:
      a. Securitron (SU) - EL-CEPT Series.

b. Or Approved Equal.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
   a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
   b. McKinney (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:
   a. McKinney (MK) - QC-C Series.
   b. Or Approved Equal.

2.4 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.

3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.

4. Pulls, where applicable, shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.

5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

6. Manufacturers:
   a. Rockwood (RO).
   b. Or Approved Equal.

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.

2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.

4. Tubular deadlocks and other auxiliary locks.

5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

6. Keyway: Manufacturer’s Standard.

C. Small Format Interchangeable Cores: Provide small format interchangeable cores (SFIC) as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.

D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer’s United States patents.

1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.

2. Manufacturers:
   a. Sargent (SA) - XC.

E. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.

2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.

3. Existing System: Field verify and key cylinders to match Owner's existing system.

F. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Three (3).

2. Master Keys (per Master Key Level/Group): Five (5).

3. Construction Keys (where required): Ten (10).

4. Construction Control Keys (where required): Two (2).

5. Permanent Control Keys (where required): Two (2).

G. Construction Keying: Provide temporary keyed construction cores.

H. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 MORTISE LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:
   a. Sargent Manufacturing (SA) - 8200 Series.
   b. Or Approved Equal.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.

2. Strikes for Bored Locks and Latches: BHMA A156.2.

3. Strikes for Auxiliary Deadlocks: BHMA A156.36.

4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.

2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.

9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

10. Rail Sizing: Provide exit device rails factory sized for proper door width application.

11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide exit devices with functions and features as follows:
    a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
    b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
    c. No catch points: addition of applied deflectors or other added components are not allowed.
    d. No visible plastic.
    e. Heavy duty end caps with flush and overlapping options made of stainless steel, brass, or bronze with architectural finishes.
    f. Constructed of all stainless steel.
    g. Stainless steel pullman type latch with deadlock feature.
    h. Narrow or wide style exterior trim as specified in the hardware sets.
    i. Center case adjustability on concealed vertical rod exit devices; single operation with hex key individually adjusts top or bottom latches. No retainer screws or clips required to maintain adjustment.
    j. Ten-year limited warranty for mechanical features.

2. Manufacturers:
    a. Sargent Manufacturing (SA) - PE80 Series.

b. Or Approved Equal.

2.9 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.

4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Large body cast iron surface mounted door closers shall have a 30-year warranty.

2. Manufacturers:
   a. Sargent Manufacturing (SA) - 281 Series.
   b. Or Approved Equal.

C. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Heavy duty surface mounted door closers shall have a 30-year warranty.

2. Manufacturers:
   a. Sargent Manufacturing (SA) - 351 Series.
   b. Or Approved Equal.

2.10 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:
   a. Rockwood (RO).
   b. Or Approved Equal.

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:
   a. Sargent Manufacturing (SA).
   b. Or Approved Equal.

2.11 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. Pemko (PE).

2. Or Approved Equal.

2.12 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:
   a. Securitron (SU) - DPS Series.
   b. Or Approved Equal.

B. Intelligent Switching Power Supplies: Provide the least number of power supplies at the appropriate amperage level sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Power supplies shall meet all functions and features as specified herein.
   a. UL listed dual voltage 12 or 24 VDC field selectable continuous output.
   b. Dedicated fast charger to prolong battery life with low battery cutoff to protect batteries from deep discharge.

c. Enhanced surge immunity for input/output protection
d. Separate, dedicated battery charging circuit to keep locks cooler.
e. Dual-color LED visual notification to prevent applying incorrect voltages to the power supply.
f. Instant auto-switch to battery on AC loss.
g. Expandable up to 16 outputs in the standard enclosure
h. Integrated fire alarm interface to allow main output shutdown or disconnect on a per output basis when using an R8 output module.
i. Network ready and remotely manage locks and connected devices when using an M8 managed output module on network models.
j. Lifetime replacement, no-fault, no questions asked warranty.

2. Manufacturers:
   a. Securitron (SU) - AQL Series.
   b. Or Approved Equal.

2.13 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. DHI TDH-007-20: Installation Guide for Doors and Hardware.

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."

4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Refer to Section 080671, Door Hardware Sets, for hardware sets.

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glazing units.

B. Plastic films.

C. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

B. Section 08 88 13 - Fire-Rated Glazing.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

F. ASTM C1036 - Standard Specification for Flat Glass; 2021.

G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

H. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

I. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

J. GANA (GM) - GANA Glazing Manual; 2022.

K. GANA (SM) - GANA Sealant Manual; 2008.

L. GANA (LGRM) - Laminated Glazing Reference Manual; 2019.

M. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (Reaffirmed 2016).

N. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.

O. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.

P. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Samples: Submit two samples 12 by 12 inch in size of insulated glass units, showing coloration and design.

E. Installer's qualification statement.

F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.06 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

C. Heat Soaked Tempered Glass: Provide a five (5) year manufacturer warranty to include coverage for spontaneous breakage of fully tempered glass caused by nickel sulfide (NiS) inclusions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Float Glass Manufacturers:

1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.

2. Guardian Glass, LLC: www.guardianglass.com/#sle.

3. Pilkington North America Inc: www.pilkington.com/na/#sle.

4. Saint Gobain North America: www.saint-gobain.com/#sle.

5. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.

6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Plastic Films Manufacturers:

1. 3M Window Film
: solutions.3m.com/wps/portal/3M/en_US/Window_Film/Solutions/#sle.

2. Flexvue Films: www.flexvuefilms.com/#sle.

3. LLumar, an Eastman Chemical Company; LLumar: www.llumar.com/#sle.

4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.

1. Design Pressure: Calculated in accordance with ASCE 7.

2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.

3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.

4. Glass thicknesses listed are minimum.

B. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:

1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.

2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.

3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.

1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.

2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.

3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.

4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

5. Tinted Type: ASTM C1036, Class 2 - Tinted, Quality - Q3, with color and performance characteristics as indicated.

6. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.04 GLAZING UNITS

A. Type G-1 - Monolithic Safety Glazing: Non-fire-rated.

1. Applications:
   a. Glazed lites in doors, except fire doors.
   b. Glazed sidelights to doors, except in fire-rated walls and partitions.
   c. Other locations required by applicable federal, state, and local codes and regulations.
   d. Other locations indicated on drawings.

2. Glass Type: Fully tempered safety glass as specified.

3. Tint: Clear.

4. Thickness: 1/4 inch, nominal.

5. Manufacturers:
   a. Glass: Any of the manufacturers specified for float glass..

2.05 PLASTIC FILMS

A. Decorative Plastic Film: Polyvinyl butyral (PVB) type.

1. Application: Locations as indicated on drawings.

2. Series Type: Frost.

3. Color: As selected by Architect from manufacturer's full range.

2.06 GLAZING COMPOUNDS

A. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

B. Manufacturers:

1. Bostik Inc: www.bostik-us.com/#sle.

2. Dow Corning Corporation: www.dowcorning.com/construction/#sle.

3. Pecora Corporation: www.pecora.com/#sle.

4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

5. Substitutions: See Section 01 60 00 - Product Requirements.

2.07 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

C. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

B. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

3.04 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.

F. Fill gaps between pane and applied stop with silicone type sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

3.05 INSTALLATION - PLASTIC FILM

A. Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.

B. Place without air bubbles, creases or visible distortion.

C. Install film tight to perimeter of glass and carefully trim film with razor sharp knife. Provide 1/16 inch to 1/8 inch gap at perimeter of glazed panel unless otherwise required. Do not score the glass.

3.06 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.07 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 08 88 13
FIRE-RATED GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire-rated glazing units.

B. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 08 14 16 - Flush Wood Doors: Glazed lites in doors.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015 (Reaffirmed 2020).

C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016 (Reapproved 2023).

G. GANA (GM) - GANA Glazing Manual 2022.

H. GANA (SM) - GANA Sealant Manual 2008.

I. GANA (LGRM) - Laminated Glazing Reference Manual 2019.

J. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use 1990 (2016).

L. ITS (DIR) - Directory of Listed Products Current Edition.

M. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.

N. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies 2022.

O. UL (DIR) - Online Certifications Directory Current Edition.

P. UL 9 - Standard for Fire Tests of Window Assemblies Current Edition, Including All Revisions.

Q. UL 10B - Standard for Fire Tests of Door Assemblies Current Edition, Including All Revisions.

R. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data on Glazing Unit Glazing Types: Provide structural, physical, and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Certificate: Certify that products of this section meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 FIELD CONDITIONS

A. Ambient Conditions: Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during, and 24 hours after installation of glazing compounds.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire-Protection-Rated Glass:

1. Manufacturers:
   a. SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite I-XL : www.safti.com/#sle.
   b. SCHOTT North America Inc; PYRAN Platinum: www.us.schott.com/#sle.
   c. Technical Glass Products: www.fireglass.com/#sle.
   d. Vetrotech North America; Keralite/Select: www.vetrotechusa.com/#sle.
   e. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.

1. Kind FT - Fully Tempered Type: Comply with ASTM C1048.

2. Impact-Resistant Safety Glass: Comply with ANSI Z97.1 - Class B, or 16 CFR 1201 - Category I criteria.

2.03 GLAZING UNITS

A. Type FPG-1 - Fire-Protection-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and does not block radiant heat, as required to achieve indicated fire rating period of 90 minutes or less.

1. Applications:
   a. Glazing in fire-resistance-rated door assembly.

2. Glass Type: Specialty tempered float glass.

3. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.

4. Safety Glazing Certification: 16 CFR 1201 Category II.

5. Glazing Method: As required for fire rating.

6. Fire-Rating Period: As indicated on drawings.

7. Markings for Fire-Protection-Rated Glazing Assemblies: Provide permanent markings on fire-protection-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction
    a. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test standards.
    b. "OH" - meets fire window assembly criteria, including hose stream test of NFPA 257 or UL 9 fire test standards.
    c. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire tests standards.
    d. "XXX" - placeholder that represents fire-rating period, in minutes.

2.04 GLAZING COMPOUNDS

A. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected from manufacturer's full range.

1. Manufacturers:
    a. BASF Corporation: www.basf.com/#sle.
    b. Dow Corning Corporation : www.dowcorning.com/construction/#sle.
    c. Pecora Corporation: www.pecora.com/#sle.
    d. Tremco Commercial Sealants & Waterproofing : www.tremcosealants.com/#sle.
    e. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

A. Setting Blocks: Aluminum silicate, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of glazing stop by thickness to suit application, self adhesive on one face.

C. Glazing Tape: Flexible tape made from spun calcium-magnesium-silica fibers in binder; designed to remain stable at temperatures up to 2,012 degrees F.

1. Thickness: As recommended by framing manufacturer for glazing application.

D. Glazing Gaskets: Flexible intumescent seals.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION - GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers unless more stringent requirements are indicated, including those in referenced glazing standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with contaminating substances that may result from construction operations including, but not limited to weld spatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from interior of building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sightline.

C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24-inch intervals, 1/4 inch below sight line.

F. Fill gaps between pane and applied stop with silicone type sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

3.05 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than four days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

A. After installation, mark pane with 'X' by using removable plastic tape or paste; do not mark heat-absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

DIVISION 09 - FINISHES

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Acoustic insulation.

D. Gypsum wallboard.

E. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 09 30 00 - Tiling: Tile backing board.

1.03 REFERENCE STANDARDS

A. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing; 2020.

B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).

C. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.

D. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020.

E. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).

F. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2020).

G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

H. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2023.

I. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.

J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.

K. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

L. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

M. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2019, with Editorial Revision (2020).

N. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

O. GA-216 - Application and Finishing of Gypsum Panel Products; 2024.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data:

1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.

B. Store metal products to prevent corrosion.

PART 2 PRODUCTS

2.01 METAL FRAMING MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.

B. Manufacturers - Metal Framing, Connectors, and Accessories:

1. ClarkDietrich: www.clarkdietrich.com/#sle.

2. MarinoWARE: www.marinoware.com/#sle.

3. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.

4. Steel Construction Systems: www.steelconsystems.com/#sle.

5. Substitutions: See Section 01 60 00 - Product Requirements.

C. Nonstructural Framing System Components: AISI S220; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.

1. Studs: C-shaped.

2. Minimum Base Metal Thickness: 0.0329 inch, unless noted otherwise

3. Runners: U shaped, sized to match studs.

4. Ceiling Channels: C-shaped.

5. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.

2.02 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:

1. American Gypsum Company: www.americangypsum.com/#sle.

2. CertainTeed Corporation: www.certainteed.com/#sle.

3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.

4. Gold Bond Building Products, LLC provided by National Gypsum Company: www.goldbondbuilding.com/#sle.

5. PABCO Gypsum: www.pabcogypsum.com/#sle.

6. USG Corporation: www.usg.com/#sle.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Use for ceilings, unless otherwise indicated.

2. Glass mat faced gypsum panels, as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.

3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   a. Mold resistant board is required at all kitchen and serving line ceiling applications .

4. Thickness:
   a. Vertical Surfaces: 5/8 inch.
   b. Ceilings: 1/2 inch.

C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Ceilings, unless otherwise indicated.

2. Thickness: 1/2 inch.

3. Edges: Tapered.

2.03 GYPSUM BOARD ACCESSORIES

A. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.

C. Decorative Metal Trim:

1. Material: Extruded aluminum alloy 6063-T5 temper.

2. Finish: Anodized, clear.

3. Type: As indicated on drawings.
   a. Products:
      1) Gordon Inc: www.gordon-inc.com/#sle.

2) Tamlyn: www.tamlyn.com/#sle.
3) Fry Reglet: www.fryreglet.com.
4) Substitutions: See Section 01 60 00 - Product Requirements.

D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

G. Nails for Attachment to Wood Members: ASTM C514.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C1007AISI S220 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.

1. Laterally brace entire suspension system.

C. Studs: Space studs at 16 inches on center.

1. Extend partition framing to structure in all locations.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.04 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

C. Installation on Metal Framing: Use screws for attachment of gypsum board.

D. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For nonrated assemblies, install as follows:

1. Single-Layer Applications: Screw attachment.

3.05 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.

B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.

C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:

1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.

2. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

1. Feather coats of joint compound so that camber is maximum 1/32 inch.

3.06 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.07 PROTECTION

A. Protect installed gypsum board assemblies from subsequent construction operations.

END OF SECTION

SECTION 09 30 00
TILING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Cementitious backer board as tile substrate.

D. Stone thresholds.

E. Ceramic trim.

F. Non-ceramic trim.

1.2 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile - Version; 2013.1.

B. ANSI A108.1A - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2013.1.

C. ANSI A108.1B - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2013.1.

D. ANSI A108.1C - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement Mortar; 2013.1.

E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2013.1.

F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2013.1.

G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 2013.1.

H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 2013.1.

I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2013.1.

J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2013.1.

K. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2013.1.

L. ANSI A108.12 - American National Standard Specifications for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 2013.1.

M. ANSI A108.13 - American National Standard Specifications for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2013.1.

N. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013.1.

O. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2013.1.

P. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2013.1.

Q. ANSI A118.8 - American National Standard Specifications for Modified Epoxy Emulsion Mortar/Grout; 2012.1.

R. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2013.1.

S. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2013.1.

T. ANSI A118.11 - American National Standard Specifications for EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 2013.1.

U. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2013.1.

V. ANSI A118.13 - American National Standard Specifications for Bonded Sound Reduction Membranes for Thin-Set Ceramic Tile Installation; 2013.1.

W. ANSI A137.1 - American National Standard Specifications for Ceramic Tile - Version; 2013.1.

X. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation - Version; 2013.1.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Samples for verification: Samples of each color of tile, marble threshold, or accessory to be provided, for verification purposes. Where products involve normal color and texture variations, included sample sets showing the full range of variations expected.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Extra Tile: 1 percent of each size, color, and surface finish combination, but not less than 25 of each type.

1.4 QUALITY ASSURANCE

A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum 5 years of documented experience.

C. Installer Qualifications: Company specializing in performing tile installation, with minimum of 5 years of documented experience.

D. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying process of the Work.

1.5 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Construct tile mock-up where indicated on the drawings, incorporating all components specified for the location.

1. Minimum size of mock-up is indicated on the drawings.

2. Approved mock-up may remain as part of the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

B. Deliver and store packaged material 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.

1.7 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS

2.1 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.

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.

2.2 TILE

A. Manufacturers: All products by the same manufacturer.

1. American Olean, www.americanolean.com

2. Daltile: www.daltile.com

3. Equivalents: See Section 01 60 00 - Product Requirements and Section 00 21 13.

B. Glazed Wall Tile, for patterns: GWT and GWT-1: ANSI A137.1, and as follows:

1. Product: American Olean, Color Story Collection

2. Breaking Strength: 120-230lbs (ASTM C648)

3. Water Absorption: <20.0%

4. Scratch Hardness: 4.0-6.0 (MOHS)

5. Chemical Resistance: Resistant (ASTM C650)

6. Finish: Gloss

7. Colors: Ice White 0025, Balance 0014 and Passion 0019. Final color(s) shall be selected by Architect from manufacturer's standard range.

8. Size: 4" x 12", 2" x 8", 4" x 12" Cove Base.

9. Thickness: 5/16 inch.

10. Trim: As required

11. Location and pattern. Refer to RFS and elevations.

C. Ceramic Mosaic Tile, Type CMT: ANSI A137.1, and as follows:

1. Product: American Olean, Unglazed Mosaics

2. Breaking Strength: >300lbs (ASTM C648)

3. Water Absorption: <5.0%

4. Scratch Hardness: (MOHS) 7.0-8.0

5. Chemical Resistance: Resistant (ASTM C650)

6. Finish: Unglazed

7. Wet Dynamic DCOF: >=0.42 (DCOF AcuTest)

8. Colors: Final color(s) shall be selected by Architect from manufacturer's standard range.

9. Size: 2" x 2" Mosaic (dot-mounted) and 1" Penny Round (dot-mounted)

10. Thickness: 1/4 inch.

11. Tim: As required

12. Location and pattern. Refer to RFS and elevations.

2.3 TRIM AND ACCESSORIES

A. Porcelain Accessories: Same color and finish as adjacent field tile; same manufacturer as tile.

B. Porcelain Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.

1. Applications:
   a. Open Edges: Bullnose.
   b. Inside Corners: Jointed.
   c. Outside Corners: Bullnose.
   d. Floor to Wall Joints: Cove base.

2. Manufacturers: Same as for tile.

C. Non-Ceramic Trim: Satin brass anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
1. Exposed edges where bullnose tile cannot be used.

D. Thresholds: Marble, white or gray, honed finish; 4 inches wide by full width of wall or frame opening; 1/2 inch thick; beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.

1. Applications:
   a. At doorways where tile terminates.
   b. At open edges of floor tile where adjacent finish is a different height.

2.4 SETTING MATERIALS

A. All mortars shall meet or exceed SCAQMD (South Coast Air Quality Management District) Rule #1168 for VOC content.

B. Latex-Portland Thin Set Cement Mortar Bond Coat: ANSI A118.4, and ANSI 118.11. Contains antimicrobial protection.

1. Products:
   a. LATICRETE International, Inc; LATICRETE 254 Platinum: www.laticrete.com.
   b. Mapei Corp: Ultracontact
   c. Substitutions: See Section 01 60 00 - Product Requirements.

2. Medium Bed Mortar: Latex modified Portland cement mortar: Comply with ANSI A118.4 and ANSI 118.11- Non Slump: for tiles larger than 14x14 on walls and floors. Mortar shall be manufactured where waterproofing membrane is used, waterproofing membrane and mortar shall be by same manufacturer.
   a. Provide the following:
      1) Laticrete 220 Marble and Granite Mortar (use with admix 3701 for submerged applications)
      2) 3N1 Performance Mortar by TEC

C. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.

1. Products:
   a. LATICRETE International, Inc; LATICRETE 3701 Fortified Mortar Bed: www.laticrete.com.
   b. Substitutions: See Section 01 60 00 - Product Requirements.

2.5 GROUTS

A. Manufacturers:

1. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout:

   www.laticrete.com.

2. Mapei Corporation; Product as required for application: www.mapei.com.

3. TEC; Product as required for application: www.tecspecialty.com

B. All grouts shall meet or exceed SCAQMD (South Coast Air Quality Management District) Rule #1168 for VOC content.

C. Standard Grout: ANSI A118.6 standard latex Portland cement grout.

1. Applications: Use this type of grout where indicated for Unglazed Wall Tile.

2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.

3. Products:
    a. LATICRETE International, Inc; LATICRETE 1500 Sanded Grout: Use with 1776 admix with anti-microbial protection. www.laticrete.com.
    b. AccuColor XT Sanded Grout TEC
    c. Mapei Ultra Color Plus, Premium Rapid setting sanded grout with polymer

D. Latex-Portland Cement Grout for Glazed Wall Tile: ANSI A118.6, consisting of commercial unsanded Portland cement grout with latex additive. For use with narrow grout joints. Provide the following, or equal, in color as selected by Architect.

1. Laticrete 1600 Unsanded premium grout

2. Accucolor XT Unsanded grout by TEC

3. Mapei Keracolor U, premium unsanded grout with polymer

E. Stain resistant Grout for floors: ANSI A118.3, consisting of commercial sanded cement grout with anti-microbial protection. Provide one of the following, in color as selected by Architect.

1. Laticrete PermaColor.

2. Accucolor XT 650 sanded by TEC

3. Opticolor by Mapei stain free grout.

2.6 THICK-BED MATERIALS

A. Mortar Bed Materials: Portland cement, sand, latex additive, and water.

1. Products:
    a. LATICRETE International, Inc; LATICRETE 3701 Fortified Mortar Bed: www.laticrete.com.
    b. TEC Specialty:
    c. Mapei Corp:
    d. Substitutions: See Section 01 60 00 - Product Requirements.

2. Thick Bed Mortar: One step polymer fortified blend of raw materials, Portland cement and aggregates. 5 % water absorption as per ANSI A118.7.3.4, 28 day comprehensive strength and flexural strength as per ANSI A118.7.3.5, shrinkage 7 day cure .05% as per ASTM C-157 and a 25 year warranty. Use the following or approved equal in areas with slope to drain:
    a. Laticrete 3701 Fortified Mortar Bed.
    b. Mapei 4 to 1 Mud Bed Mix.

2.7 ACCESSORY MATERIALS

A. Waterproofing Membrane/ crack isolation membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.

1. Type: Bonded Sheet Membrane.

2. Anti-fracture protection up to 1/8" over nonstructural cracks.

3. ASTM C627- Robinson Floor test, ANSI A118.10, ANSI A118.12.

4. Antimicrobial Protection

5. Installation: Allow for flood testing in 2 hours at 70 degrees F of higher. Tile can be installed directly onto membrane.

6. Thickness: 25 mils, minimum, dry film thickness.

7. Products:
   a. LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com.
   b. Mapei AquaDefense.

B. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

C. Metal Cove Base: Aluminum Cove-shaped profile for floor/wall transitions, inside and outside corners. Similar to Schluter DILEX-AHK.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

C. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

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 unit 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.

3.3 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install ceramic accessories rigidly in prepared openings.

G. Install non-ceramic trim in accordance with manufacturer's instructions.

H. Install thresholds where indicated.

I. Sound tile after setting. Replace hollow sounding units.

J. Keep control and expansion joints free of mortar, grout, and adhesive.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

N. Jointing Pattern: If offset pattern is required for rectangles larger than 12 inches, the offset shall be no greater than 33%.

O. 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.

P. Before grouting entire area do a test area to assure there will be no permanent staining or discoloration of the tile and to verify that the grout is easily removed from the surface. If necessary, pre-coat exposed surfaces of tile with a grout release as recommended by the manufacturer.

3.4 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

1. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.

B. Install tile-to-tile floor movement joints in accordance with TCNA (HB) Method EJ171F.

3.5 INSTALLATION - FLOORS - MORTAR BED METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F111, with cleavage membrane, unless otherwise indicated.

1. Where waterproofing membrane is indicated, with standard grout or no mention of grout type, install in accordance with TCNA (HB) Method F121.

B. Cleavage Membrane: Lap edges and ends.

C. Mortar Bed Thickness: 5/8 inch, unless otherwise indicated.

3.6 INSTALLATION - WALL TILE

A. On exterior walls install in accordance with TCNA (HB) Method W244, thin-set over cementitious backer units, with waterproofing membrane.

B. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244.

C. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

D. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.7 CLEANING

A. Clean tile and grout surfaces.

B. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

C. Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

D. Sealing: Seal all non-glazed ceramic tile surfaces including tile and grout with a penetrating sealer. Apply per manufacturer’s instructions. Do not seal porcelain tile.

E. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.8 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

B. Where tiled surfaces will be subject to equipment or wheel traffic or heavy construction traffic, and during move-in of furniture and equipment, cover protective covering with 1/4" hardboard, plywood or similar material.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at time and place to be determined.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and pre-consumer recycled content and cost.

2. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-emitting materials.

C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

D. Samples for Initial Selection: For components with factory-applied finishes.

E. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Panels: Set of 6-inch-square samples of each type, color, pattern, and texture.

2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch-long Samples of each type, finish, and color.

3. Clips: Full-size hold-down, impact and seismic clips as required.

F. Delegated-Design Submittal: For seismic restraints for ceiling systems.

1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.

2. Structural members to which suspension systems will be attached.

3. Method of attaching hangers to building structure.
   a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.

5. Size and location of initial access modules for acoustical panels.

6. Items penetrating finished ceiling and ceiling-mounted items including the following:
   a. Lighting fixtures.
   b. Diffusers.
   c. Grilles.
   d. Speakers.
   e. Sprinklers.
   f. Access panels.
   g. Perimeter moldings.

7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.

8. Minimum Drawing Scale: 1/8 inch = 1 foot

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Evaluation Reports: For each acoustical panel ceiling suspension system from ICC-ES.

E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 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. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed. No less than one full box.

2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

3. Hold-Down Clips: Equal to 2 percent of quantity installed.

4. Impact Clips: Equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.

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.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Ceiling products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Ceiling products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design seismic restraints for ceiling systems.

D. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

E. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A, B, and C according to ASTM E 1264.

2. Smoke-Developed Index: 450 or less.

F. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Gypsum.

2. Armstrong World Industries, Inc.

3. Tectum Inc.

B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Acoustical Panels TYPE - 1: Mineral fiber, ASTM E 1264 Type A, Form A2.2, pattern E, Class A.

1. Size: 24 x 48 inches.

2. Thickness: 3/4" inches (19 mm).

3. Composition: Mineral fiber.

4. Light Reflectance: 88 percent, determined as specified in ASTM E 1264.

5. NRC Range: 0.75, determined as specified in ASTM E 1264.

6. Ceiling Attenuation Class (CAC): 35, determined as specified in ASTM E 1264.

7. Articulation Class (AC): N/A

8. Edge: Square Lay-in

9. Surface Color: White.

10. Sag Resistance Treatment: Armstrong HumiGaurd Plus or equivalent. Superior resistance to sagging in high humidity conditions.

11. Anti-Mold and Mildew Treatment: Face and back of panel treated with anti-microbial treatment and provides guaranteed resistance against growth of mold/ mildew and Gam-positive and Gam-negative odor/stain causing bacteria for 30 years.

12. Warranty: 30 year system.

13. Recycled content greater than 50%.

14. Classified as low-emitting per standards established by the Collaborative for High-Performance Schools - CHPS Section 1350 requirements. (Independent test reports available upon request).

15. Surface Pattern: Fine texture.

16. Product: Ultima: 1913

17. Suspension System: Exposed grid Type 1.

D. Acoustical Panels TYPE - 3: Mineral Fiber, ASTM E 1264 Type IX, Form 2, pattern G, Class A.

1. Size: 24 x 48 inches.

2. Thickness: 5/8 inches.

3. Light Reflectance: 89 percent, determined as specified in ASTM E 1264.

4. NRC Range: N/A.

5. Sound Blocking (CAC): 33.

6. Edge: Square Lay-In 15/16”.

7. Surface Color: White.

8. Water Repellent – product resists water for 15 minutes.

9. Sage Resistance Treatment: Armstrong HumiGuard Plus or equivalent. Superior resistance to sagging in high humidity conditions.

10. Anti-Mold and Mildew Treatment: Face and back of panel treated with anti-microbial treatment and provides guaranteed resistance against growth of mold / mildew and Gam-positive and Gam-negative odor/stain causing bacteria for 30 years.

11. Warranty: 30 year system.

12. Recycled Content: Up to 36%.

13. Classified as low-emitting per standards established by the Collaborative for High-Performance Schools - CHPS Section 1350 requirements. (Independent test reports available upon request).

14. Surface Pattern: Smooth texture.

15. Product: Kitchen Zone 672, by Armstrong.

16. Suspension System: Exposed grid Type 1 with hold down clips.

2.4 METAL SUSPENSION SYSTEM

A. Manufacturers:

1. Same as for acoustical units.

2. Armstrong

3. USG Interiors, Inc.

4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

C. Exposed Steel Suspension System Type 1: Formed hot dipped galvanized steel.

1. Profile: Double flange, for square edge panels, with recess; 15/16 inch wide face.

2. Construction: Double web with Superlock click-in-place installation system.

3. Seismic Performance: Suspended Grid Ceiling Accessories for Seismic Design Category "C" Locations.

4. Finish: White.

5. Recycled content greater than 12.5% (25% pre-consumer, 0% post-consumer).

6. Product: Prelude XL, by Armstrong.

D. Drywall Grid System , ASTM C 635 Heavy Duty main beam classification, ASTM A 653 zinc coated hot dipped galvanized steel. Exposed surface chemically cleansed, zinc coated and pre-finished. Materials conform to the performance standard ASTM C 645 (Standard Specification for Rigid Furring Channels for Screw applications of Gypsum Board)

1. Components
   a. Main Beam: Double-web constructions, profile height 1-11/16" with peaked roof top bulb and 1-1/2" knurled flange.
   b. Cross Tees: Double-web constructions, profile height 1-11/16" with peaked roof top bulb and 1-1/2" : knurled flange.
   c. Molding: Provide manufacturer's recommended molding at window where grid will be visible from exterior.

2. Seismic Performance: Suspended Grid Ceiling Accessories and perimeter supports for Seismic Design Category "C" Locations.

3. Product Drywall Grid system by USG Inc.

2.5 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.

1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Seismic Performance: Suspended Grid Ceiling Accessories and perimeter supports for Seismic Design Category "C" Locations.

D. Touch-Up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.2 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636/C 636M, ASTM E 580/E 580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including mechanical and electrical components, for maximum deflection of 1:360.

C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junction with other interruptions.

1. Use longest practical lengths.

2. Overlap and rivet corners.

3.3 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Lay directional patterned units with pattern parallel to longest room axis.

D. Fit border trim neatly against abutting surfaces.

E. Install units after above-ceiling work is complete.

F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

G. Cutting Acoustical Units:

1. Make field cut edges of same profile as factory edges.

2. Double cut and field paint exposed reveal edges.

H. Install hold-down clips on panels within 20 ft. of an exterior door and in toilet rooms.

1. Accessories: Install accessories as applicable to meet the project requirements.

3.4 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members: Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 65 00

RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rubbert tile.

B. Resilient rubber base.

C. Installation accessories.

1.2 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

C. ASTM F970 - Standard Test Method for Static Load Limit; 2007 (Reapproved 2011).

D. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).

E. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

F. BAAQMD 8-51 - Bay Area Air Quality Management District Regulation 8, Rule 51, Adhesive and Sealant Products; www.baaqmd.gov; 2002.

G. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.

H. GEI (SCH) – GREENGUARD "Children and Schools" Certified Products; GREENGUARD Environmental Institute; current listings at www.greenguard.org.

I. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

J. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

K. SCS (CPD) - SCS Certified Products; Scientific Certification Systems; current listings at www.scscertified.com.

1.3 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns, and colors available; and installation instructions.

B. Shop Drawings: Indicate seaming plan.

C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

E. LEED Report shall contain the following information where applicable:

1. VOC content for sealants and adhesives as required by Division 01.

2. Report rapidly renewable content and urea-formaldehyde content.

3. Recycled Content, pre-consumer, and post-consumer.

4. Location of Manufacturer.

5. Applicable environmental certifications including FloorScore certification or equivalent.

6. End of use recyclable content.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect roll materials from damage by storing on end.

1.5 FIELD CONDITIONS

A. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).

B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 68 degrees F to achieve temperature stability. The permanent HVAC should be fully operational, controlled and set at a minimum of 68 degrees F for a minimum of seven days prior to, during, and seven days following the installation.

PART 2 PRODUCTS

2.1 RESILIENT FLOORING

A. Manufacturers:

1. Armstrong Flooring: www.arstrongflooring.com

2. Tarkett: www.tarkett.com

3. Equivalents: See Section 01 60 00 - Product Requirements and Section 00 21 13.

B. Rubber Floor Tile (RFT):

1. Manufacturer:
   a. Tarkett Commercial, www.tarkett.com
   b. Substitutions: See Section 01 60 00 – Product Requirements.

2. Product: Defiant, Oil & Grease Resistant Tile, homogeneous composition of 100% synthetic rubber, that meets the performance requirements of ASTM F1344, Type 1-A and 1-B, Grade 1 Specification for Rubber Floor Tile.

3. Slip Resistance (ASTM D2047): ≥ 0.5 SCOF

4. Static Load Limit: (ASTM F970): Passes at 250 psi with less than 0.005” residual indentation

5. Fire Performance: ASTM E648/NFPA 253 (Critical Radiant Flux) – Class 1
   ASTM E662/NFPA 258 (Smoke Density) – 450 or less

6. Chemical Resistance: (ASTM F925): Passes – 5% Acetic acid, 70% Isopropyl alcohol, Sodium hydroxide solution (5% NaOH), Hydrochloric acid solution (5% HCl), Sulfuric acid solution (5% H2SO4), Household ammonia solution (5% NH4OH), Household bleach (5.25% NaOCl)

7. Oil Resistance: (ASTM D471): Animal fats, vegetable oils, mineral oils, motor oils, hydraulic oils, and anti freeze.

8. Total Thickness (ASTM F386): 0.125" (3.17 mm

9. Hardness: (ASTM D2240): ≥ 85 Shore A.

10. Abrasion Resistance: (ASTM D3389): < 1.00 gm loss.

11. Size: 12x12 inch, 24x24inch.

12. Colors: Up to 4 colors, chosen by Architect from manufacturer’s full range and as shown on floor finish patterns.

13. Installation: Follow manufacturer's instructions and use recommended adhesive for heavy wheeled traffic.

2.2 RESILIENT BASE

A. Resilient Base: Type (RB). ASTM F 1861, Type TP, rubber, thermoplastic; top set Style B, Cove, and Style A straight and as follows:

1. Meets the performance and dimensional requirements of ASTM F-1861, type TV, group 1 standard specifications for resilient wall base.

2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.

3. Height: 4 inches (100 mm).

4. Thickness: 0.125 inch (3.2 mm) thick.

5. Finish: Satin.

6. Length: 100' or 120' coils

7. Profiles: Coved/ with toe.

8. Color: Color as selected from manufacturer's full line.

9. Recycled Content: Contains 14% pre-consumer content.

10. End of Use: Product shall be 100% recyclable at end of useful life.

11. Rapidly renewable materials: Product to contain 1% rapidly renewable content.

12. VOC Content: Product to be third party certified to comply with FloorScore requirements and guidelines for indoor air quality.

13. Manufacture location within 500 miles.

14. Warranty- Limited 1- year warranty.

15. Manufacturers:
    - Johnsonite, a Tarkett Company: www.johnsonite.com.
    - Roppe Corp: www.roppe.com.
    - Substitutions: See Article II Section 2.20 Equivalents - Approved Equal.

2.3 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

1. Provide only products having lower volatile organic compound (VOC) content than required by the more stringent of the South Coast Air Quality Management District Rule No.1168 and the Bay Area Air Quality Management District Regulation 8, Rule 51.

2. Provide High-Moisture Adhesive where required due to high relative moisture content of concrete slab. All adhesive shall be manufacturers recommended to protect warranty.

C. Moldings, Transition and Edge Strips: Rubber.

D. Color: To be selected by architect from manufacturers full line and coordinate with base and rubber flooring materials.

E. Rubber Transition Strips: Provide in locations of exposed edges, or where flooring finishes of dissimilar material/height meet.

1. Product: CTA-XX-N manufactured by Johnsonite, or approved transition for application.
2 Resilient Edge/Transition Strips: Height and shape required to protect exposed edge of resilient flooring and of maximum lengths to minimize running joints. Moldings shall comply with ADA requirements and exceed ASTM E 648 Class 1 Flammability requirements.

F. Filler for Coved Base: Plastic.

G. Sealer and Wax: Types recommended by flooring 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, rH, and pH tests 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.

3.2 PREPARATION

A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive flooring.

B. Use trowel-able 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 pattern 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 non- permanent, non-staining 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 tile where required by tile manufacturer.

3.4 INSTALLATION OF RESILIENT BASE AND ACCESSORIES

A. General: Install resilient accessories according to manufacturer's written installation instructions.

B. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.

C. 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.

3.5 CLEANING

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.

3.6 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, varnishes, and other coatings.

C. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from any custom or standard colors and finishes available.

D. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

E. Do Not Paint or Finish the Following Items:

1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.

2. Items indicated to receive other finishes.

3. Items indicated to remain unfinished.

4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.

5. Floors, unless specifically so indicated.

6. Glass.

7. Concealed pipes, ducts, and conduits.

1.02 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.

2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.

3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.

4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.

5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

D. GreenSeal GS-11 - Paints and Coatings; 2013.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all finishing products, including VOC content.

C. Material List: Provide an inclusive list of required coating materials referenced to the substrates. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification. Cross reference any substitutions to Benjamin Moore products specified and indicate substrate; substitutions without cross reference will be returned due to lack of information for evaluation.

D. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.

E. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.

F. LEED Report: VOC content of all interior opaque coatings actually used.

G. Manufacturer's Instructions: Indicate special surface preparation procedures.

H. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

I. Qualification Data: For firms and persons specified in the "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.

1.05 EXTRA MATERIALS: FURNISH THE FOLLOWING FOR OWNER'S USE IN MAINTENANCE OF PROJECT.

A. See Section 01 60 00 - Product Requirements, for additional provisions.

B. Extra Paint and Coatings: 1 gallon (4 L) of each color; store where directed.

C. Label each container with color in addition to the manufacturer's label.

D. Coating Maintenance Manual: Upon Conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as the Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule. Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care, and cleaning instructions, touch up procedures, and color samples of each color and finish used.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3- years' experience.

C. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.07 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Duplicate finish of approved prepared samples.

C. The Architect will select one room or surface to represent surfaces and conditions for each color selected.

1. W all Surfaces: Provide samples on at least 100 sq. ft. (9 sq. m) of wall surface.

2. Small Areas and Items: Architect will designate items or areas required.

D. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.

1. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.

2. Final approval of colors and textures will be from job-applied samples.

E. Mock-up may remain as part of the work if approved.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, VOC content, instructions for mixing and reducing, and mixed date.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

D. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.09 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F (7 degrees C) for interiors; 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions. Maximum temperature is 90 degrees F (32 degrees C).

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions. Maximum temperature is 95 degrees F (35 degrees C).

F. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer.

B. Paints:

1. Base Manufacturer: Sherwin Williams Co.

2. PPG Professional Paints: www.ppg.com.

3. Benjamin Moore & Co: www.benjaminmoore.com.

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating. All paints and coatings shall be of professional grade.

1. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2. Supply each coating material in quantity required to complete entire project's work from a single production run.

3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Volatile Organic Compound (VOC) Content:

1. Provide coatings that comply with the most stringent requirements specified in the following and refer to schedule for any specific requirements:
   a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   b. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings; www.otcair.org; specifically:
      1) Opaque, Flat: 50 g/L, maximum.
      2) Opaque, Non-flat: 150 g/L, maximum.
      3) Opaque, High Gloss: 250 g/L, maximum.
      4) Varnishes: 350 g/L, maximum.
   c. Architectural coatings VOC limits of New York.
   d. USGBC LEED Rating system for IEQc4.2 Applicable VOC limits. Following guidelines from SCAQUMD Rule 1113, 2004 and Green Seal GS-11, 1993. Shall comply with the following limits (in g/L minus water):
      1) Interior flat coating or primer: 50
      2) Interior non-flat coating or primer: 150
      3) Anti-corrosive/ anti-rust paint: 250
      4) Clear wood finish: Lacquer: 550
      5) Clear wood finish: Sanding sealer: 350
      6) Clear wood finish: Varnish: 350
      7) Clear brushing lacquer: 680
      8) Floor coatings: 100
      9) Sealers and under-coaters: 200
      10) Shellac: Pigmented: 550
      11) Stain:250
      12) Concrete curing compounds:350
      13) Waterproofing sealers: 250
      14) Waterproofing concrete/ masonry sealers: 400

2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

3. Tints/Colorants Shall Add No VOC

D. Chemical Content: The following compounds are prohibited:

1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.

E. Flame Spread Rating:

1. All products must meet or exceed Class A: (0-25) Flame Spread Index and (0-450) Smoke Developed Index and in accordance to ASTM E84.

F. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

G. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

H. Colors: As indicated on drawings.

1. Selection to be made by Architect after award of contract.

2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.

3. Extend colors to surface edges; colors may change at any edge as directed by Architect.

4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

5. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Test shop-applied primer for compatibility with subsequent cover materials.

C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Gypsum Wallboard: 12 percent.

2. Plaster and Stucco: 12 percent.

3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.

4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

5. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

6. Concrete Floors and Traffic Surfaces: 8 percent.

D. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

E. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.02 PREPARATION

A. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

B. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.

D. Remove or repair existing coatings that exhibit surface defects.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, efflorescence, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

    1. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

    2. Brush all surfaces with a stiff fiber brush to remove all loose particles.

    3. Cure all surfaces for a minimum of 60 days before painting.

    4. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

H. Gypsum Board Surfaces to be Painted: Repair all surface defects with finishing compound for wallboard joint concealment or spackling compound, filled out flush and smooth, and sanded. Remove all sanding dust and verify that joint compound is dry prior application of primer. After application of prime coat, again fill and sand smooth all defects that have been made visible by primer coat application. Remove all sanding dust and spot prime over areas of repair.

I. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

J. Concrete Floors and Traffic Surfaces to be Painted: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

K. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

L. Galvanized Surfaces to be Painted: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods. Lightly sand surfaces with 200 or greater grit sand paper, and solvent clean in accordance with SSPC-SP1. Apply coat of etching primer.

M. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

1. New Surfaces Without Shop Coat: Solvent clean to remove oil and grease in accordance with SSPC-SP1. Surfaces that contain loose rust, loose mill scale, and other foreign substances shall be mechanically cleaned by power wire brushing in accordance with SSPC-SP3. Remove welding flux, slag and fume deposits, weld spatters, and burrs. Immediately apply primer coat, before rust re-appears.

2. Shop Coated Surfaces: Protect from corrosion before and after installation by treating corroded areas immediately upon detection. W ire brush or sand abraded or corroded spots to bright metal and touch up with same paint used for shop coat.

N. Aluminum and Stainless Steel Surfaces: Clean surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Lightly sand surfaces with 200 or greater grit sand paper, and solvent clean in accordance with SSPC-SP1.

O. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

P. Interior Wood Surfaces to Receive Opaque Finish: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

Q. Interior Wood Surfaces to Receive Transparent Finish: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

1. 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.

2. When transparent finish is required, back prime with spar varnish or polyurethane.

R. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

S. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

3. Use only thinners approved by paint manufacturer and only within recommended limits.

T. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.03 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.

2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

3. Provide finish coats that are compatible with primers used.

4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.

5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

6. Paint interior surfaces of ducts with a flat, non-specular black paint where visible through registers or grilles.

7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

8. Sand lightly between each succeeding enamel or varnish coat.

B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

2. Omit primer on metal surfaces that have been shop primed and touchup painted.

3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

4. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

5. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

D. Application Procedures: Apply paints and coatings by brush or roller according to the manufacturer's directions. Spray application is not permitted, unless specifically approved by Architect in advance for each individual situation. Roller application on woodwork is not permitted.

1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.

2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

E. 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.

F. In addition to items listed on the finish schedule and finish drawings, general construction items which require painting are include but are not limited to the following:

1. Steel ladders.

2. Steel supports.

3. Roof hatches and smoke vents

4. Steel stairs and railings.

5. Steel lintels.

6. Exposed structural steel.

7. Steel louvers.

8. All other items which are not factory finished.

G. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

1. Mechanical items to be painted include, but are not limited to, the items indicated on drawings.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

L. Provide satin finish for final coats.

M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

O. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

B. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

C. Correcting Defective Work:

1. Repair and repaint all defective surfaces that have been painted, stained, finished, or otherwise treated under this Section, to the satisfaction of the Architect and at no additional cost.

2. Rejected surfaces shall be repainted over the entire plane on which they occur (corner to corner/floor to ceiling/etc.) and as otherwise required by the Architect.

D. Protect finished coatings until completion of project.

E. Touch-up damaged coatings after Substantial Completion.

3.06 SCHEDULE - EXTERIOR

A. Type EP-1 Precast, Masonry paint..

1. Lusterless (Flat) Acrylic Finish: Two finish coats over masonry conditioner.
   a. Primer Coat: S-W Loxon Conditioner (LX03W0100
   b. First Coat: S-W Loxon Acrylic Coating (A24W350 series)
   c. Second Coat: S-W Loxon Acrylic Coating (A24W350 series)

B. Type EP-2 Concrete: Cementitious Siding, Flexboard, Transite Board, Non-Roof Shingles, Common Brick, Stucco, Tilt-up, Precast, and Poured-in-place Cement.

1. Latex Systems: Semi-Gloss Finish:
   a. 1st Coat: S-W Loxon Concrete and Masonry Primer Sealer, LX02W50 (5.3-8.0 mils wet, 2.1-3.2 mils dry).
   b. 2nd Coat: S-W Pro Industrial Acrylic Semi-Gloss, B66-650 Series.
   c. 3rd Coat: S-W Pro Industrial Acrylic Semi-Gloss, B66-650 Series. (6.0-12.0 mils wet, 2.0-4.0 mils dry per coat).

C. Type EP -5 Ferrous Metals, Structural Steel: High-performance, polyamide-epoxy/polyurethane coating system - two finish coats over metal primer. Sherwin Williams - no substitutions.

1. Metal Primer: High-performance aromatic urethane, zinc rich primer; Sherwin Williams Corothane I Gal Va Pac Zinc Primer Series B65G00010

2. First Coat: High-performance, polyamide-epoxy coating; Sherwin Williams Macropoxy 646 Fast Cure Epoxy, Series B58W00610, tinted slightly lighter than top coat.

3. Second Coat: Two component high-performance, pigmented, aliphatic acrylic polyurethane coating; Sherwin Williams HS Polyurethane 250 Series B65-300.

D. Type EP-6 Zinc-Coated (Galvanized) Metal: Full-gloss, acrylic-enamel finish - 2 finish coats over a galvanized metal primer. .

1. Primer: Galvanized metal primer: Sherwin-Williams DTM Primer/Finish (B66 W00011)

2. First and Second Coats: Full-gloss, exterior, acrylic enamel; Sherwin-Williams DTM Acrylic Coating B66W01051.

E. Type EP-7 Exterior Wood: Two Coats Satin Self Priming Acrylic Latex

1. First and Second Coats: Sherwin Williams Duration K33 Series

3.07 SCHEDULE- INTERIOR

A. Type IP-1 Concrete Masonry Units: Eggshell, latex-enamel finish - 2 finish coats over a block filler.

1. Block Filler: High-performance, latex-based, block filler; Sherwin-Williams Loxon Block Surfacer, Series LX01W0200.

2. First and Second Coats: Eggshell, latex enamel, Sherwin Williams Super Paint Air Purifying Interior Latex Eggshell (A87 Series)

B. Type IP-2 Gypsum Drywall and Veneer Plaster Walls: Eggshell, latex enamel finish 2 finish coats over a primer.

1. Primer: Latex-based, interior primer: Sherwin-Williams Pro Mar 200 Zero VOC Primer (B28 Series)

2. First and Second Coats: Eggshell, acrylic latex, , SuperPaint Air Purifying interior paint zero VOC, Low Odor; Sherwin-Williams SuperPaint Air Purifying Interior Paint Satin(A87 series (Satin)).

C. Type IP-2.1 Existing Gypsum Drywall, Veneer Plaster Walls and CMU Walls: Semi-gloss, latex enamel finish 2 finish coats over spot primer, as required.

1. Primer: Latex-based, interior primer: Sherwin-,SuperPaint Air Purifying Interior Latex (A87 series).

2. First and Second Coats: Satin, acrylic latex,; Sherwin-Williams SuperPaint Air Purifying Interior Latex (A87 series).

D. Type IP-2.2. Existing Wallcovering to be painted.

1. Ensure that the existing wall covering is sound and filly adhered to the wall. If pealing wall covering is pealing, wallcovering must be removed..

2. Primer: Sherwin Williams PrimeRX acrylic bonding primer, sealer, clear, Series B51T00600

3. First and Second Coats: Semi-gloss, latex enamel, SuperPaint Air Purifying interior paint; Sherwin-Williams SuperPaint Air Purifiying Interior Latex Semigloss(A88 Series).

E. Type IP-3 Gypsum Board and Veneer Plaster Ceilings: Flat latex enamel finish - 2 finish coats over a primer..

1. Primer: Latex-based, interior primer: Sherwin-Williams SuperPaint Air Purifying Interior Latex Flat (A86 Series)

2. First and Second Coats: Flat, acrylic latex, interior paint, Super Paint Air Purifying Interior Latex Flat (A86 Series)

F. Type IP-4 Gypsum Wallboard: Egg-shell, waterborne acrylic epoxy finish - 2 finish coats over a primer. Use at wet areas, janitor's closets and maintenance areas. .

1. Primer: Sherwin Williams ProMar 200, Zero VOC interior latex primer, B28W02600

2. First and Second Coats: SW Pro Industrial Pre Catalyzed Epoxy, K45W00151 series.

G. Type IP-4.1 Gypsum Wallboard: Semi-gloss, latex based finish. Use in Bathroom applications.

1. Primer: Latex-based, interior primer: Sherwin-Williams Pro Mar 200 Zero VOC Primer (B28 Series)

2. First and Second Coats: Semi-gloss, acrylic latex, , Super Paint Air Purifying interior paint; Sherwin-Williams SuperPaint Air Purifying Interior Latex Semigloss (A88 Series)

H. Type IP-5 Concrete Masonry Units: Satin, waterborne acrylic epoxy finish - 2 finish coats over a block filler. Use at wet areas, janitor's closets and maintenance areas..

1. Block Filler: Sherwin Williams Loxon Block Surfacer, LX01W0200 Series

2. First and Second Coats: SW Pro Industrial Pre Catalyzed Epoxy, K45W00151 series.

I. Type IP-5 Concrete Masonry Units: Satin, waterborne acrylic epoxy finish - 2 finish coats over a block filler. Sherwin Williams, no substitution. Use at wet areas, janitor's closets and maintenance areas.

1. Block Filler: High-performance, waterborne cementitious acrylic block filler; Sherwin Williams Cement Plex 875 Acrylic Block Filler B42W00200 Series

2. First and Second Coats: Sherwin Williams Pro Industrial Water Based Catalyzed Epoxy B73W00361.

J. Type IP-6: Exposed Structural Ceilings Ferrous and Galvanized Metal"

1. Waterborne Acrylic Coating, Flat Finish with flash rust resistance and low odor and low VOC (White or Black only). .

2. Primer: Sherwin Williams Pro Industrial Pro Cryl Primer (B66 Series) on Steel if not factory primed.

3. First and Second Coats: Sherwin Williams Pro Industrial Waterborne Acrylic Dryfall (B42).

K. Type IP-7 Stained Wood and Woodwork: Polyurethane-based satin finish - 2 finish coats of a polyurethane-based, clear-satin finish over an alkyd-based, interior wood stain. Provide wood filler on open-grain wood before applying first coat.

1. Stain Coat: Alkyd-Based, interior wood stain; Sherwin Williams Minwax Performance 250 Stain

2. First and Second Finish Coats: Polyurethane satin finish; Sherwin-Williams MinWax Fast Dry Polyurethane

L. Type 8: Painted Wood Trim. Prep existing wood trim as required to accept new paint.

1. Primer: 1 coat Sherwin Williams Premium Interior Wall and Wood Primer (B28 W8111)

2. First and Second Coats: Semi-gloss, latex enamel, Sherwin Williams SuperPaint Air Purifying Interior Latex Semigloss (A88 Series)

M. Type IP-9 Natural-Finish Wood and Woodwork: Polyurethane-based varnish, satin finish - 2 finish coats of a polyurethane-based, satin finish. Provide wood filler on open-grain wood before applying first coat.

1. First and Second Finish Coats: Waterborne Polyurethane satin finish; Sherwin-Williams Wood Classics 250 VOC Stain Series.

N. Type IP-10 Hollow Metal Doors, Frames, and Sidelights, and Ferrous Metals: Semigloss, interior acrylic enamel finish - 2 finish coat over primer. Primer is not required on shop-primed items.

1. Primer: Quick-drying, rust-inhibitive, alkyd-based or epoxy-metal primer; Sherwin-Williams Pro Industrial Pro Cryl Universal Metal Primer (B66 series)

2. First and Second Coats: Semi-gloss, exterior, acrylic enamel; Sherwin-Williams DTM Acrylic Coating B66-100.

O. Type IP-10a Shop Primed Metal, drywall, masonry, wood or concrete. Zero VOC, two coats over shop primed items.

1. Two finish coats Sherwin Williams ProMar 200 Interor Latex, zero VOC. Low sheen, deep base B24W04653.

P. Type IP-11 Aluminum and Galvanized Metals: Semigloss, interior acrylic enamel finish - 2 finish coat over primer. Primer is not required on shop-primed items..

1. Primer: Galvanized metal primer: Sherwin-Williams Pro-Industrial Pro-Cryl Universal Primer B66-310 series

2. First and Second Coats: Semi-gloss, Sherwin Williams Pro Industrial Acrylic Coating B66-600 Series

Q. Type IP-12 Concrete Floors: Sealed Concrete Floors: Gloss, high solids, urethane finish - 2 finish coats over prepared concrete. Coordinate sealer with that specified in Section 03 31 00.

1. First and Second Coats: Sherwin-Williams, ArmorSeal 8100, Clear (B70 Series)

R. Type IP-12.1 Concrete Floors: Epoxy finish- two finish coats over primer and surface preparation.

1. Mechanical Surface Preparation: SSPC-SP13/NACE 6or ICRI 03732: Power tool methods as per ASTM D4259. Use to remove existing coating, laitance, weak concrete. Method include circular grinding, sanding, and wire brushing.

2. Primer: B70-8100 - ArmorSeal® 8100 Water Based Epoxy Primer (Part A) Off White. 2 Coats: B70-8100 - ArmorSeal®

3. 8100 Water Based Epoxy (Part A) White/Tint Base

S. Type IP-13 Concrete Floors: Semigloss, waterborne epoxy-amine self-priming finish 2 finish coats over prepared concrete.

1. Primer: ArmorSeal 8100 Primer

2. First and Second Coats: SW ArmorSeal 8100 (B70 series)

T. Type IP-14 Painted Wood Floor - Three (3) finished coats over a primer.

1. Primer: Water based primer, SW ArmorSeal Tread-Plex Primer

2. First and Second Coats: ArmorSeal Tread-Plex Water Based Acrylic Floor coating (B90 series)

U. Type IP-16 Lane Marking Paint: Sherwin Williams SetFast Solvent-Based Striping Paint.

V. Type IP-17 Electrostatic Spray Painting: Sherwin Williams Pro Industrial Urethane Alkyd 10% MEK mx. Prepare surface as stated above in Part 3 Execution, by washing and removing any existing peeled or checked paint, and by following the instructions of the paint manufacturer and paint sprayer manufacturer.

END OF SECTION

SECTION 09 98 00

MASONRY COLOR TREATMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Emulsion Color Treatment for Masonry.

1.2 SUBMITTALS

A. See Section 01 30 00 “Administrative Requirements” for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of five (5) years’ experience.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of three (3) years demonstrated experience in installing products of the same type and scope as specified.

C. Environmental Regulations: Submit certification that products listed in this section comply with Federal, State and Local VOC regulations.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish area approximately 48” (1,200 mm) long by 16” (400 mm) high, as directed in field by architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation. Wherever possible, store materials in a secure, indoor facility.

B. Keep products away from sparks or open flame.

C. Keep all water based materials from freezing.

D. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.5 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.6 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

1. Duration: Twenty-five (25) years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Nawkaw Corporation; NawTone Acrylic Stain: www.nawkaw.com

B. PermaTint Limited: permatint.com

C. Substitutions: See Section 01 60 00 “Product Requirements”.

D. The specified materials/products of NawKaw Corporation are the design standard to which materials/products of other accepted manufacturer(s) shall comply.

2.2 SCOPE

A. Apply a material that acts as water repellant while modifying the existing color of the masonry surface on above grade vertical or splayed masonry surfaces.

2.3 EMULSION COLOR TREATMENT

A. General: Hydrous, multiple polymer formulation of resin solids and color pigments. UV resistant, light-fast and mold, mildew and fungus resistant.

B. Performance:

1. Specific Gravity: 1.27 - 1.31.

2. Viscosity at 72 F (22 C): 70 - 95 KU.

3. Solids (Weight): 36 to 39 percent.

4. Solids (Volume): 31 to 34 percent.

5. pH: 8.5 - 9.5.

6. Gloss / Sheen: Flat.

7. Volatile Organic Compound (VOC): Less than 5 percent.

C. Finish:

1. Color: Formulate to color as selected by the Owner or Architect.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that surfaces to receive Work are structurally sound and fully intact.

C. Verify that new masonry has cured at least twenty-one (21) days prior to starting Work.

D. Verify that surfaces to receive Work have a neutral pH.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation. Allow surfaces to dry completely before applying coating.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Where present, treat alkali or efflorescence with a neutralizing agent recommended for the surface.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Do not proceed with Work when ambient temperatures are less than 25 F (4 C) or greater than 110 F (43 C).

C. Verify color uniformity twelve (12) hours after application. Recoat areas where blotches, blemishes or imperfections are present.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Protect shrubs, metal, wood trim, glass, asphalt, and other building hardware from overspray during application.

C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

DIVISIONS 10 - SPECIALTIES

SECTION 10 11 01

VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Magnetic Markerboards

1.02 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.

B. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.

C. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board; 2012.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. ASTM F793 - Standard Classification of Wall Covering by Use Characteristics; 2010a.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data on markerboard, tackboard, tackboard surface covering, trim, accessories, and display cases, menu boards and magazine racks.

C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.

D. Samples: Submit color charts for selection of color and texture of markerboard, tackboard, tackboard surface covering, and trim.

E. Test Reports: Show conformance to specified surface burning characteristics requirements.

F. Manufacturer's printed installation instructions.

G. Maintenance Data: Include data on regular cleaning, stain removal .

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 WARRANTY

A. See Section 01 70 00 – Execution Requirements, for additional warranty requirements.

B. Submit a "life of the building" warranty, stating that under normal usage and maintenance, and when installed in accordance with manufacturer's instructions and recommendations, porcelain enamel steel markerboard and chalkboard writing surfaces are guaranteed for the life of the building. Guarantee covers replacement of defective boards but does not include cost of removal or reinstallation.

C. A standard warranty, stating that when installed in accordance with manufacturer's instructions and recommendation, Claridge tackboards are guaranteed for one year against defects in materials and workmanship. Guarantee does not cover normal wear and tear, improper handling, any misuse, or any defects caused by vandalism or subsequent abuse. Guarantee covers replacement of defective material but does not include cost of removal or reinstallation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Markerboards

1. Claridge Products and Equipment, Inc; www.claridgeproducts.com.

2. Platinum Visual Systems: www.pvsusa.com.

3. ASi Visual Display Products .www.asi-visualdisplayproducts.com

4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MARKERBOARDS

A. Performance requirements.

1. Surface-burning characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate marking of applicable testing agency.
   a. Flame-spread index: 25 or less.
   b. Smoke-developed index: 450 or less.

B. Markerboards: Porcelain enamel on steel, laminated to core.

1. Construction: Steel covered on both sides with enamel coatings in accordance with PEI-1002 Manual and Performance Specifications for LCS Porcelain Enamel Writing Surfaces.

2. Height: 48 inches (1220 mm) or as indicated on schedule.

3. Color: As selected from manufacturer's full range.

4. Length: As indicated on schedule.

5. Frame: Extruded aluminum, with concealed fasteners.

6. Frame Finish: Anodized, natural.

7. Accessories: Provide chalk tray, map rail, and flag holder.

8. Recycled content: Cold rolled steel shall be manufactured from a minimum of 30 percent post-consumer and post-industrial waste. Fiberboard shall contain 90% post-industrial waste.

C. Materials:

1. Enameled Steel Sheet: ASTM A 424, Type I, Commercial Steel, with fired-on vitreous finish.

2. Hardboard for Cores: AHA A135.4, Class 1 - Tempered, S2S (smooth two sides).

3. Fiber Board: ASTM C 208, cellulosic fiber board. Class A rated.

4. Foil Backing: Aluminum foil sheet, 0.005 inch thick.

5. Adhesives: Type used by manufacturer.

D. Accessories:

1. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall, full width of frame.

2. Map Supports: Formed aluminum sliding hooks and roller brackets to fit map rail.

3. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

4. Flag Holders: Cast aluminum bored to receive 1 inch diameter flag staff, bracketed to fit top rail of board.

5. Chalk Tray: Aluminum, manufacturer's standard profile one piece full length of chalkboard, molded ends; concealed fasteners, same finish as frame.

6. Mounting Brackets: Concealed.

7. Display Rail: Extruded Aluminum, manufacturer's standard profile, with cork insert, with the ability to be screwed directly to plaster or block walls, 2" wide and lengths as required on plans and elevations. Similar to Claridge product No. 74, Deluxe Map and Display Rail.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

A. Installation of all products shall be in accordance with manufacturer's instructions.

B. Secure units level and plumb.

C. Butt Joints: Install with tight hairline joints.

D. Installation of Boards:

1. Install with top of chalk tray at 36 inches above finished floor or as indicated on drawings.

3.03 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

B. Cover with protective cover, taped to frame.

C. Remove temporary protective cover at Date of Substantial Completion.

3.04 SCHEDULE

A. Refer to sizes located on drawings.

END OF SECTION

SECTION 10 14 19

DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cutout dimensional characters.

1.02 REFERENCE STANDARDS

A. AAMA 2603-2013: Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels

B. ASTM B 209-14: Specification for Aluminum and Aluminum-Alloy Sheet and Plate

C. ASTM D 1187/D 1187M-97 (Reapproved 2011: Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal

1.03 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For signs.

1. Include fabrication and installation details and attachments to other work.

2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.

3. Show message list, typestyles, graphic elements, and layout for each sign.

C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer.

B. Sample Warranty: For special warranty.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.07 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.

1. Uniform Wind Load: As indicated on Drawings.

2. Concentrated Horizontal Load: As indicated on Drawings.

3. Other Design Load: As indicated on Drawings

4. Uniform and concentrated loads need not be assumed to act concurrently.

2.02 DIMENSIONAL CHARACTERS

A. Cutout Characters: Characters with uniform faces; square-cut, smooth edges; precisely formed lines and profiles; and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ASI Sign Systems, Inc.: asisignage.com
b. Gemini Incorporated.: www.geminisignproducts.com
c. InPro Corporation (IPC).: www.inprocorp.com
d. APCO: www.apcosigns.com
e. Substitutions: See Section 01 60 00 "Product Requirements".

2. Character Material: Sheet or plate aluminum.

3. Character Height: As indicated on Drawings.

4. Thickness: Manufacturer's standard for size of character.

5. Finishes:

a. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color as selected by Architect from manufacturer's full range.

6. Mounting: Concealed studs.

7. Typeface: Arial.

2.03 DIMENSIONAL CHARACTER MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.04 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.

2. For exterior exposure, furnish nonferrous-metal devices unless otherwise indicated.

3. Sign Mounting Fasteners:

a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.05 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.

2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.

3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.

4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.

5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

2.06 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.07 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Verify that electrical service is correctly sized and located to accommodate signs.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.

2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.

b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

3.03 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 10 14 23

ROOM-IDENTIFICATION SIGNAGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Room-identification signs.

1.2 REFERENCE STANDARDS

A. 36 CFR 1191 – Americans with Disabilities Act (ADA) Accessibility Guidelines for Building and Facilities, Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards – Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ICC A117.1 – Accessible and Usable Building and Facilities; 2009.

1.3 SUBMITTALS

A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.

B. Product Data: For each type of product.

C. Shop Drawings: For room-identification signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, and graphic elements, including raised characters and Braille, and layout for each sign.

D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Room-Identification Signs: Full-size Sample.

E. Product Schedule: For room-identification signs. Use same designations indicated on Drawings or specified. Submit for approval by Owner through Architect prior to fabrication.

F. Selection Samples: Submit two sets of color selection charts or chips.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer ad manufacture.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

B. Manufacturer's Installation Instruction: Include installation templates and attachment devices.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.8 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
    a. Deterioration of finishes beyond normal weathering.
    b. Deterioration of embedded graphic image.
    c. Separation or delamination of sheet materials and components.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Mohawk Sign Systems, Inc.: www.mohawksign.com

B. Substitutions: See Section 01 60 00 – Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Signage shall consist of room number and room function to meet the requirements of the Americans with Disabilities Act 1990 (ADA) and CABO / ANSI A117.1 – 1992.

2.3 GRAPHIC PROCESS

A. All signs shall be manufactured using a sand – carved process from hard phenolic ES/MP plastic laminate. Sandblasting shall remove background material, leaving raised characters of 1/32". The braille and copy characters shall remain an intrinsic part of the sign that cannot be removed. .

B. All text shall be accompanied by Grade 2 braille. Braille shall be separated 1/2" from the corresponding raised characters or symbols.

C. All letters, numbers and / or symbols shall contrast with their background.

D. Size of letters and numbers shall be as follows:

1. Room numbers shall be 1".
2. Lettering for room ID Signs shall be 3/4".
3. Symbol size shall be 4".
4. Standard Grade 2 braille shall be 1/2" below copy.

2.4 ACCESSORIES

A. Adhesive: As recommended by sign manufacturer.

B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

2.5 SIGN TYPES

A. Sign Type A: Room function signs:

1. 2" x length as required.
2. Copy: Room name or number with Grade 2 braille below.

B. Sign Type B: Classroom signs:

1. 6” x 6”
2. One window, two windows where required, Window inserts by owner.
3. Copy: Room number with Grade 2 braille below.

C. Sign Type C: Restroom signs:

1. 8” x 8”
2. 4” accessibility symbol and toilet symbol.
3. Copy – All Gender Restroom, Grade 2 braille below.

D. Refer to renovation plans for locations.

2.6 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Accessibility: Install signs in locations on walls as indicated on Drawings and according to the accessibility standard.

C. Mounting Methods:

1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.2 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 10 28 00

TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.

1.02 REFERENCED STANDARDS

A. ASTM A 153/A 153M-05: Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

B. ASTM A 653/A 653M-11: Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A 666-10: Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

D. ASTM A 1008/A 1008M-12a: Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

E. ASTM B 456-11: Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

F. ASTM C 1503-08 (Reapproved 2013): Specification for Silvered Flat Glass Mirror.

G. ASTM F 446-85 (Reapproved 2009): Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.

H. Code of Federal Regulations. 29 CFR - Labor; Chapter XVII - Occupational Safety and Health Administration, Department of Labor, Part 1910 - "Occupational Safety and Health Standards," Section 19 10 .141 - "Sanitation”.

I. International Code Council. ICC A117.1: Accessible and Usable Buildings and Facilities. (ANSI)

1.03 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.04 SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.

3. Include electrical characteristics.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.

2. Identify accessories using designations indicated on Drawings.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.06 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.

2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.02 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

B. Grab Bar TA-9:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.
   d. Substitutions: See Section 01 60 00 – Product Requirements for substitutions.
2. Mounting: Flanges with exposed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
   a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/2 inches.
5. Length:
   a. Accessible Water Closet Compartment: TA-9a, 36 inches mounted horizontally behind water closet; TA-9b, 42 inches mounted horizontally to side of water closet; TA-9d, 18 inches mounted vertically to side of water closet.
6. Configuration and Length: As indicated on Drawings.

C. Mirror Unit TA-5:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.
   d. Substitutions: See Section 01 60 00 – Product Requirements for substitutions.
2. Frame: 20 gauge type 304 satin finish stainless steel channel.
   a. Corners: One-piece roll formed member that encases mirror and backing revealing a tight mitered corner.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
   a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
4. Glazing: Tempered Glass – ¼” thick polished tempered glass with two coats of silver. Hermetically sealed. Back of mirror finished with waterproof paint. Glazing must meet ASTM C-1503 & ASTM C 1048-92

5. Size:
    a. Type TA-5a: 18 inches wide by 36 inches high, Model #0620-B1836 (Asi).

D. Robe Hook (TA-17): 11 gauge, Type 304 stainless steel, all welded construction, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish. Hook shall project from wall 1 1/8".
    a. Product: B-233 manufactured by Bobrick.

2.03 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. 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.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.04 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.02 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written instructions.

3.03 SCHEDULE

A. See Drawings for Toilet Accessory Schedule, mounting heights and locations for toilet accessory types listed above.

END OF SECTION

SECTION 10 51 13

METAL LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Welded standard lockers.

B. Related Requirements:

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 each type of metal locker.

B. Shop Drawings: For metal lockers.

1. Include plans, elevations, sections, and attachment details.

2. Show locker trim and accessories.

3. Include locker identification system and numbering sequence.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available.

D. Product Schedule: For lockers.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. The following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than five units:
   a. Locks.
   b. Blank identification plates.
   c. Hooks.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

B. Deliver combination control charts to Owner.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate sizes and locations of concrete masonry bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures.
   b. Faulty operation of latches and other door hardware.

2. Damage from deliberate destruction and vandalism is excluded.

3. Warranty Period for Welded Metal Lockers: Lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain metal lockers and accessories from single source from single locker manufacturer.

1. Obtain locks from single lock manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: For lockers indicated to be accessible, comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

2.3 WELDED STANDARD LOCKERS TYPE 1 (L-1)

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Lyon; lyonworkspace.com.

2. List Industries Inc.; listindustries.com
   a. Fully-framed all-welded P.E. Series Four Tier Locker. 12”w x 15”d x 72”H

3. ASI Storage Solutions; asistorage.com

B. Doors: One-piece, 14-gauge steel, 7 knuckle, 13 Ga. Butt hinge welded to door and riveted to frame.

1. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 18 gauge 0.048-inch nominal-thickness steel sheet; welded to inner face of doors.

2. Door Style: Diamon ventilation.

C. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

1. Frame / Vertical side panels: shall be of 13 gauge ½” flattened expanded metal framed by 16 gaug hollow “T” tubular sections.

2. Backs: Shall be 18 gauge cold rolled sheet steel, be continuous to cover a multiple framed unit and be welded to each vertical side panel frame member.

D. Frames: Channel formed; fabricated from 16 gauge 0.060-inch nominal-thickness. Vertical members shall have an additional flange to form continuous door strike. Corners shall be lapped and welded into a rigid assembly. In addition, bottom cross members shall have tang at each end that fits through slot in rear flange of upright frame member to prevent twisting out of alignment. Top and bottom cross members shall provide support for front edge of locker top and locker bottom.

E. Hinges: Hinges shall not be less than 3-1/2" long 13 gauge seven knuckle pin type, securely riveted to frame and welded to the door. Doors are to be secured to frame with a minimum of two tamper resistant rivets per hinge. Provide 3 hinges for doors 48" and higher and 2 for doors shorter than 48". All doors shall be right hand side hinged.

F. Recessed Door Handle and Latch: All wardrobe doors 20” high and over shall have a seamless drawn not less than 304 stainless steel recessed handle shaped to receive a padlock or built-in combination lock. The recessed handle shall be deep enough to have the lock be completely flush with the outer door face.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks; positive automatic latching and prelocking.
   a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 12 gauge 0.105-inch nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
   b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

G. Quiet Locking Device: Channel shaped locking device with full length reinforcing ribs shall be a quiet design utilizing nylon guide inserts to reduce metal-to-metal contact. The locking device shall include a latch finger that engages the 12-gauge door jamb. Lock bar shall be enclosed on three sides and operate within the channel formation of the door. Locking device shall be prelocking so mechanism can be locked in open position – door locking automatically when closed. An optional single point latch shall be available except on 9" wide lockers. Box lockers shall have one-point locking device with a 14-gauge lock clip for attaching padlock. Doors also to be provided with lock hole filler to permit use of built in lock.

H. Identification Plates: Optional aluminum number plates with etched figures at least 3⁄8" high. All lockers shall have number plates attached near top of door.

I. Hooks: All hooks to be zinc plated or subjected to a comparable rust retardant treatment and attached with two bolts.

J. Recess Trim: End and top recess trim for lockers to be placed in wall recesses shall be 18-gauge formed steel with a 2-3⁄4" wide face and shall be bolted to locker frames. Top recess trim to be in approximately 5'0" lengths with a formed splice cap to cover joints and to hold top recess trim in alignment. End recess trim to be 2-3⁄4" higher than lockers and will lap over ends of top recess trim for a hairline joint at top of corners.

K. Free-Standing Lockers: Lockers shall be furnished with 6" legs. Optional front and end closed bases available.

L. Anchoring: to prevent tipping or injury, Lyon strongly recommends that lockers be floor and/or wall anchored.

M. Materials:

1. Prime, high grade Class 1 mild annealed, cold-rolled steel free from surface imperfections. A.S.T.M.-A1008. Galvannealed steel available for high humidity atmospheres. A.S.T.M.-A653. Bolts to be zinc plated or subjected to other rust-retardant treatment.

N. Finish: Exposed steel parts shall be thoroughly cleaned, given a bonding and rust inhibitive phosphate treatment and then electrostatically sprayed with powder coat. NOTE: Contact Lyon for finish compatibility with any chemicals.

1. Color: Architect shall choose from manufacturer's full line.

2.4 LOCKS

A. Ready for owner provided padlock.

2.5 FABRICATION

A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.

2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

C. Equipment: Provide each locker with an identification plate and the following equipment:

1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.

D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.

E. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.

2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

3. Provide 5% of the total locker count as handicapped accessible units.

F. Recess Trim: Fabricated with 3-inch face width and in lengths as long as practical; finished to match lockers.

G. Base Trim: Fabricated with 1-inch face width x 2-inch angle and in lengths as long as practical; finished to match lockers.

H. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.

2.6 ACCESSORIES

A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

B. Anchors: Material, type, and size required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls for corrosion resistance.

2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lockers level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.

2. Anchor single rows of metal lockers to walls near top and bottom of lockers.

B. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.

C. Equipment:

1. Attach hooks with at least two fasteners.

2. Attach door locks on doors using security-type fasteners.

3. Identification Plates: Identify metal lockers with identification indicated on Drawings.

   a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.

D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach recess trim to recessed metal lockers with concealed clips.

2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.

3.3 ADJUSTING

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

3.4 PROTECTION

A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION

SECTION 10 56 13
METAL STORAGE SHELVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal storage shelving.

B. Shelving accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 53 – Miscellaneous Rough Carpentry: Blocking and reinforcement in walls for anchoring shelving units.

1.03 REFERENCE STANDARDS

A. ANSI MH28.1 - American National Standard for the Design, Testing, Utilization and Application of Industrial Grade Steel Shelving - Specifications; 1997.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Rated uniform shelf loads.

2. Details of shelving assemblies, including reinforcement.

3. Accessories.

C. Test Reports: Provide independent agency test reports documenting compliance with specified structural requirements.

D. Shop Drawings: Indicate location, type, and layout of shelving, including lengths, heights, and aisle layout, and relationship to adjacent construction.

1. Indicate methods of achieving specified anchoring requirements.

E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Inspect for dents, scratches, or other damage. Replace damaged units.

B. Store in manufacturer's unopened packaging until ready for installation.

C. Store under cover and elevated above grade.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Four Post Shelving:

1. Hallowell, Div. of List Industries, Inc;: www.hallowell-list.com.

2. Penco Products, Inc;: www.pencoproducts.com.

3. SpaceSaver Corporation;: www.spacesaver.com.

4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SHELVING - GENERAL

A. Shelving: Provide products certified to comply with ANSI MH28.1 for design criteria, lateral stability, shelf connections, and shelf capacity.

B. Anchors: Provide anchoring hardware to secure each shelving unit to floor and wall.

1. Provide hardware of type recommended by manufacturer for substrate.

2.03 FOUR POST SHELVING

A. Four Post Shelving: Steel post-and-beam or post-and-shelf type with sway bracing, shelving brackets, shelving surfaces, and accessories as specified.

1. Shelf Capacity: Uniform distributed load of 50 psf (2.4 kPa), minimum.

2. Shelf Deflection: L/140, maximum, under specified uniform load.

3. Adjustability of Shelving: At intervals of 6 inches (150 mm) on center, minimum.

4. Unit Depth: Not more than 1/4 inch (6 mm) greater than shelf depth.

5. Unit Height: 72 inches overall .

6. Finish: Baked enamel, medium gloss.

7. Color: Manufacturer's standard gray.

8. Provide single-face and double-face units where indicated.

9. Number of Units: As indicated on drawings.

B. Posts and Beams: Formed sheet members; perforations exposed on face of members are not acceptable.

1. Metal Thickness: 16 gage, 0.0598 inch (1.52 mm).

2. Post Shape: Tee intermediate posts, angle end posts forming corners.

3. Post Face Width: 2 inches (51 mm), maximum.

4. Connecting Hardware: Manufacturer's standard.

5. Post Bases: Flat steel foot plate, with manufacturer's recommended adjustable leveling device.

C. Bracing: Formed sheet members.

1. Back Sway Bracing: Either strap or panel; at back of each unit.

2. Side Sway Bracing: Either strap or panel; at each side of each unit.

3. Strap Sway Bracing: One strap installed diagonally, 16 gage, 0.0598 inch (1.52 mm); welded, riveted, or bolted to uprights.

4. Panel Sway Bracing: Formed sheet metal panels, 20 gage, 0.0359 inch (0.91 mm); welded, riveted, or bolted to uprights.

D. Shelves: Formed sheet, finished on all surfaces, with slots for dividers.

1. Metal Thickness: 16 gage, 0.0598 inch (1.52 mm).

2. Shelf Connection to Posts via male/ female rivets: Manufacturer's standard.

2.04 ACCESSORIES

A. Kick Plates: Formed sheet metal; enclose open space between bottom shelf and floor on all front sides and open ends; finished to match.

2.05 SCHEDULE

A. MT-1: 48”W x 24”D x 78”H

B. MT-2: 48”W x 18”D x 78”H

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate is level and that clearances are as specified.

B. Verify that walls are suitable for shelving attachment.

C. Do not begin installation until substrates have been properly prepared.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor and reinforce as specified, as indicated on drawings, and as recommended by manufacturer.

C. Install shelving with shelf surfaces level and vertical supports plumb; adjust feet and bases as required.

D. Out-Of-Square Tolerance - Four Post Shelving: Maximum of 1/8 inch (3 mm) difference in distance between bottom shelf and canopy top, measured along any post in any direction.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

DIVISION 11 - EQUIPMENT

SECTION 11 30 13

RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Refrigeration appliances.

B. Related Requirements:

1. Section 22 40 00 "Plumbing Fixtures" for kitchen sinks, dishwasher air-gap fittings, waste (garbage) disposers, and instant hot- water dispensers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.

2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Sustainable Design Submittals:

1. Product Data: For indicated products, indicating compliance with requirements for ENERGY STAR product labeling.

2. Product Data: For water-efficient clothes washer, indicating compliance with requirements.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard size.

D. Product Schedule: For appliances refer to plans and elevations for locations.

1. Type RA-2, Compact Refrigerator:
   a. Capacity: 2.7 cu. ft.
   b. Approximate Dimensions: 17.75 in. W. x 31.5 in. H. x 25 in. D.
   c. Controls: External Digital
   d. Lighting: LED
   e. Power: 120v; 60 Hz; 15A
   f. Shelves: (4) shelves

g. Features: Reversible Door Hinge, Locking Door, Temperature Control. ADA Compliant
h. Exterior Finish: Stainless.
i. Model: FF1843BSSADA.
j. Manufacturers:
    1) Summit Appliances; www.summitappliance.com
    2) Substitutions: See Section 01 60 00 – Product Requirements.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: For each type of appliance.

C. Field quality-control reports.

D. Sample Warranties: For manufacturers' special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintains, within 50 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

1.7 WARRANTY

A. Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period for each appliance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of residential appliance from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Gas-Fueled Appliances: Certified by a qualified testing agency for each type of gas-fueled appliance according to ANSI Z21 Series standards.

C. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

2.3 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.

C. Examine walls, ceilings, and roofs for suitable conditions where overhead exhaust hoods and microwave ovens with vented exhaust fans will be installed.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install appliances according to manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.

2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.

3. Operational Test: After installation, start units to confirm proper operation.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

B. An appliance will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances.

END OF SECTION

DIVISION 12 - FURNISHINGS

SECTION 12 24 94

ROLLER SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manually operated shades.

1.2 SUBMITTALS

A. Product Data: Provide description of shade material, construction, and function.

B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details and dimensions not shown in Product Data.

C. Samples: Submit two fabric samples, 4 x 4 inch in size, illustrating material and color.

D. Maintenance Data: For roller shade to include in maintenance manuals. Include the following:

1. Methods for maintaining roller shades and finishes.

2. Operating hardware

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed installation of roller shades in similar extent to that indicated for this project and whose work has resulted in a successful in-service performance.

B. Mockups

1. Provide one mock-up, standard classroom window size, illustrating operation and light blocking capability.

2. Locate where directed.

3. Approved mock-up may remain as part of the Work.

C. Source Limitations: Obtain Roller shades through one source from a single manufacturer.

D. 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 Rating: Passes NFPA 701.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Deliver shades to project site in manufacturer's standard protective shipping containers.

B. Store shades under cover and elevated above grade.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work is 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 clearance for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.6 EXTRA MATERIALS

A. Supply one shade of each size for Owner's use in maintenance of project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Shades:

1. Clutch Operated FlexShade by Draper.
   a. Fabric: SunBloc Series SB9000/9100 Opaque

2. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 SHADE MATERIALS

A. Shade Material –Opaque: Close-woven fiberglass between two layers of flexible vinyl.

1. Composition 25% fiberglass; 75% PVC coating.

2. Weight/su. Yar: 12 oz.

3. Color: As selected by Architect from manufacturer's full range.

4. Openness: Opaque.

5. Fire Rating: NFPA-701-1999 TM#1 (small scale) NFPA 101 (Class A Rating), UBC (Class 1), ASTM-G21 and STTM-G22.

6. Bacterial and Fungal Resistance: ASTM G 21 and ASTM 1428 Certified

7. VOC Emissions: GREENGUARD Children & Schools certified as a low emitting fabric. Manufacturer to supply GREENGUARD Children & Schools certificate.

8. Sizes available: 72" and 120" roll widths.

9. Product: Basis of Design- Sunbloc series SB9000/ SB9100 (duopak / duplex)

2.3 FABRICATION ROLLER SHADE

A. Product Description: Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation.

1. Provide Manual Clutch-Operated FlexShade by Draper or equal.

B. Components: Noncorrosive, self-lubricating materials.

C. Rollers Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.

D. Direction of Roll: Regular, from back of roller.

E. Mounting Brackets: Galvanized or zinc-plated steel, style for between jamb mounting unless otherwise indicated.

F. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.

1. Endcap covers: To match fascia or head box color.

G. 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.

1. Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. No notching is required.

H. 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.

I. Shade Operation: Manual; with continuous loop bead chain, clutch, and cord tensioner hold down device and bracket lift operator.

1. Position of Clutch Operator: Right side of roller, as determined by hand of user facing shade from inside, unless otherwise indicated on Drawings.

2. Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon. White or Black color as selected by Architect

3. Loop Length: Length required to make operation convenient from floor level

4. Bead Chain: Stainless steel. Manually operated bead chain/clutch system.

J. Shade Units: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 degrees F (23 degrees 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.

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. Verify that areas are completed and ready for shades.

B. Verify that openings are ready to receive the Work.

C. Ensure structural blocking and supports are correctly placed.

3.2 INSTALLATION

A. Install shades in accordance with manufacturer's instructions.

B. Size each unit to fit window, and seal against light.

C. Attach Rescue Window Label to each unit that is located at a Rescue Window.

1. Sticker to have black lettering on bright yellow background.

2. Sticker size to be 5” wide x 3” high.

D. Locate space at multiple unit assemblies to occur at window mullions.

E. Refer to floorplans for installation locations.

3.3 ADJUSTING

A. Adjust units for smooth operation free from binding throughout entire operational range.

3.4 CLEANING

A. Clean as recommended by manufacturer.

B. Do not permit use of shades or blinds prior to Substantial Completion.

END OF SECTION

SECTION 12 34 00

PLASTIC LAMINATE-FACED CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops.

B. Cabinet hardware.

C. Prefinished surfaces.

D. Preparation for installing utilities.

E. Furnish and install high-pressure laminate casework and accessories as shown and listed on drawings and specified herein. Include all countertops, sink cutouts, splashes, supports, shelving, and filler panels necessary for a complete casework installation.

F. The Casework Contractor shall verify all critical building dimensions prior to fabrication of casework. The Casework Manufacturer shall re-engineer the casework arrangements to dimensions requiring 2-1/2" or less of filler at each end of wall to wall elevations, and to ensure a complete and satisfactory installation.

G. Provide all labor for unloading, distribution, and installation of casework and related items as specified.

1.02 REFERENCES

A. AWI (Architectural Woodwork Institute) - Quality Standards. Section 1600 “Modular Casework.”

B. BHMA A156.9 - Cabinet Hardware.

C. FS MMM-A-130 - Adhesive, Contact.

D. HPMA (Hardwood Plywood Manufacturer's Association) HP - American Standard for Hardwood and Decorative Plywood.

E. NEMA (National Electric Manufacturers Association) LD3 - High Pressure Decorative Laminates.

F. NHLA (National Hardwood Lumber Association).

G. PS 1 - Construction and Industrial Plywood.

H. PS 20 - American Softwood Lumber Standard.

I. ANSI-A135: for all hardboard.

J. ANSI-A161.2-1998: for performance of fabricated high-pressure decorative laminate countertops.

K. ANSI-A208.1-2016: for grade M-3i mat-formed wood particleboard.

L. SEFA 8PL Recommended Practices: for cabinet construction.

M. AWS: American Woodworking Standards, Edition 2.

1.03 RELATED REQUIREMENTS PERFOMED BY OTHERS

A. Division 06 Section: “Miscellaneous Rough Carpentry” for blocking within walls to adequately support casework.

B. Division 07 Section: “Joint Sealants” for caulking of casework and/or countertops to abutting walls.

C. Division 08 Section: “Door Hardware” for cabinet locks keyed or master keyed to building locks.

D. Division 09 Section: “Resilient Flooring” for resilient base applied to manufactured casework.

E. Division 22 Section: “Plumbing” for furnishing, installation, and hook-up of sinks, fixtures, outlets, strainers, tailpieces, traps, vacuum breakers, and stops shall be performed by the plumbing contractor to state and local codes. In all cases, sink cutouts shall be by the casework contractor.

F. Division 23 Section: “Heating, Ventilating, and Air-Conditioning” for furnishings, installation, and final connections of all ductwork to range hoods shall be by the HVAC contractor.

G. Division 26 Section: “Electrical” for the electrical contractor to state and local codes shall perform electrical furnishing, installation, and final connections of wiring, conduit, and/or electrical items within casework.

1.04 SUBMITTALS FOR REVIEW

A. Section 01 30 00 - Submittals: Procedures for submittals.

B. Product data for each type of product and process specified and incorporated into items of architectural woodwork during fabrication, finishing, and installation.

C. Shop drawings showing 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, including concealed blocking and reinforcing specified in other Sections.

3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.

D. Samples for initial selection of the following in the form of manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.

1. Plastic laminates.

E. Samples for verification of the following:

1. Laminate-clad panel products, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with separate samples of unfaced panel product used for core.

2. Corner pieces as follows:
   a. Cabinet joinery same showing details and style of joinery between end panels and horizontal members.

3. Exposed cabinet hardware, two units for each type and finish.

F. Product certificates signed by casework fabricator certifying that products comply with specified requirements.

G. Qualification data for firms and persons specified in the "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.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing manufactured casework 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. Installer Qualifications: Arrange for manufactured casework installation by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this Project.

C. Single-Source Responsibility for Fabrication and Installation: Engage a qualified casework manufacturing firm to assume undivided responsibility for fabricating, finishing, and installing casework specified in this Section.

D. Quality Standard: Except as otherwise indicated, comply with the following standard:

1. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute Section 1600 for grades, construction, finishes, and other requirements.
   a. Provide AWI Certification Labels or Certificates of Compliance indicating that casework meets requirements of grade 1600 specified.
   b. Provide AWI Certified Compliance Certificate for Installation.
   c. Mark one unit of each elevation of casework and plastic-laminate countertop with AWI Certified Compliance Label indicating quality grade required.

2. The Contract Documents contain selections chosen from options in the Quality Standard as well as additional requirements beyond those of the Quality Standard. Comply with such selections and requirements in addition to the Quality Standard.

1.06 REQUIREMENTS FOR PLASTIC LAMINATES AND PLASTICS

A. Plastic laminate utilized in components of this section shall meet the following requirements:

1. Class A or B Finish for all high pressure decorative laminate to be utilized in kitchens, storerooms, maintenance or repair areas, places of assembly or on a stage; flame spread of 0-25, for Class A Finish, flame spread of 25-75 for Class B Finish, per ASTM E-84, NFPA-255 or UL-723.

2. Class C Finish shall be used in all other spaces; flame spread of 76-200 per ASTM E-84, NFPA-255 or UL-723.

3. Under no circumstances shall any material having a smoke developed rating of 450 or more be utilized anywhere in the building. Smoke developed ratings shall be determined per ASTM E-84.

B. Plastics utilized in components of this section shall meet the following requirements:

1. Flame spread rating of any plastic components shall be 0 – 25 per ASTM E84.

2. Smoke developed rating of any plastic components shall be less than or equal to 450 per ASTM E84.

3. Smoke density rating of any plastic components shall be less than or equal to 75 per ASTM D2843.

4. The burning rate of any plastic components shall be less than or equal to 2.5 CM/Min per ASTM D635.

5. The self-ignition temperature for any plastic components shall be less than or equal to 600ºF per ASTM D1229.

C. Fire rated plastic laminate and backer board. For use in corridors. Fire-Rated Laminate shall offer a Class I or A fire rating. Fire-retardant adhesives and substrates must be used.

1. General Fire Code Compliance Test data for code compliance is from the UL 723 Tunnel Test method. This procedure has been cataloged under the following designations: American Society for Testing Materials ASTM E 84 American Society for Testing Materials ASTM E 162 American Society for Testing Materials ASTM E 662 American National Standards Institute ANSI No. 2.5 National Fire Protection Agency NFPA No. 255 Underwriters Laboratories, Inc. UL No. 723

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Section 01 60 00 – Product Requirements: Transport, handle, store, and protect products.

B. Protect casework during transit, delivery, storage, and handling to prevent damage, spoilage, and deterioration.

C. Do not deliver casework until painting 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 whose environmental conditions meet requirements specified in "Project Conditions."

1.08 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 – Product Requirements: Environmental conditions affecting products on site.

B. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

C. Environmental Limitations: Obtain and comply with casework fabricator's and Installer's coordinated advice for optimum temperature and humidity conditions for casework during its storage and installation. Do not install casework until these conditions have been attained and stabilized so that casework will be within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

D. Field Measurements: Where casework is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Verify locations of concealed framing, blocking, reinforcements, and furring that support casework by accurate field measurements before being enclosed. Record measurements on final shop drawings.

2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating casework without field measurements. Provide allowance for fillers at site and coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

1.09 COORDINATION

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

B. Coordinate with electrical and plumbing contractors to ensure accurate location of services.

1.10 WARRANTY

A. The casework manufacturer and contractor shall guarantee casework materials and workmanship for three years from the date of installation. Defects reported within the guarantee period shall be corrected without charge and shall be warranted against structural failure (of the cabinet body) for a period of ten years from the date of installation. Accessories provided as part of this work shall be guaranteed for one year from the date of installation (sinks, fittings, apparatus, countertops, etc.).

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:

1. Case Systems, Case System I.

2. Equivalents: Refer to Document 00 21 13.

2.02 MATERIALS

A. Exterior Vertical Surfaces:

1. All door and drawer fronts, finished end panels, and exposed exterior backs shall be surfaces with .028 inch thick high-pressure decorative laminate conforming to NEMA Standard LD3-1995, GP-28.

2. High Pressure Laminate is available in non-premium, non-specialty and manufacturers' standard suede finishes from our select laminate manufacturers, including:

3. Standard: Wilsonart® in a "60" or "38" matte finish and Standard: Nevamar® in a "T" textured finish and Standard: Formica in a "58" finish and Standard: Pionite in an "SD" finish. Other manufacturer finishes are available with additional cost and longer lead times.

4. Color: Up to (4) cabinet and (4) Countertop colors per building.

5. All exterior vertical high-pressure laminate panels shall be balanced with textured .020 inch thick high-pressure cabinet liner conforming to NEMA Standard LD3-1985, CL-20.

6. All exterior vertical panels to be laminated using a PVA adhesive and a cold press method, resulting in a rigid glue line. Contact method of laminating shall not be allowed.

B. Exposed Interior and Semi-exposed Exterior Surfaces:

1. Interior surfaces behind doors, drawer boxes, backs, and unfinished ends shall be laminated with a Light Beige, Greystone, or White thermally fused laminate that meets rob exceeds the performance standards for NEMA LD3-1995 for GP-28. All panels shall be of "BALANCED" construction. Fast cycle thermally fused, melamine foil or polyester surfaced panels or other surface types that do not meet these requirements are not acceptable.

2. High Pressure Laminate at all open interiors, underside of wall cabinet bottoms, interiors of glazed door cabinets shall be considered exposed and finished in Decorative High-Pressure GP-28 laminate.

C. Edges:

1. All doors and drawer edging shall be machine applied color through 3mm PVC. The edge shall be applied utilizing hot melt adhesive and radiused on both sides by automatic trimmers. No hand trimming shall be allowed. 3mm PVC to be available on a minimum of twenty-two (22) standard colors.

2. Exposed cabinet body edges shall be machine hot melt applied color through .020 inch PVC. Color of edge shall match the door/drawer edge color selection. The leading edge of shelves, except when exposed, shall be edged with .020 inch PVC matching the interior color. Use on all cabinet body edges except cubbies.

D. Particleboard:

1. All particleboard, unless noted otherwise, shall be industrial grade according to the American National Standard for Mat-Formed Wood Particleboard, ANSI A208-1, Grade 1-M-3, and meet or exceed the following:
   a. Density 47 lbs./cu. ft.
   b. Moisture Content 6%
   c. Modulus of Rupture 2400 psi
   d. Modulus of Elasticity 450,000 psi
   e. Internal Bond 80 psi
   f. Hardness 900 pounds
   g. Linear Expansion .030%
   h. Thickness Tolerance .005% +/-
   i. Face Screw Holding 325 pounds
   j. Edge Screw Holding 275 pounds

E. Hardware:

1. Pulls: One pull shall be located at the centerline of the drawer, regardless of width, to ensure ease of operation and maximize drawer slide life. The following pulls shall be available at no cost difference:
   a. 8mm diameter, 96mm o/c clear anodized aluminum wire pull.
   b. Contour plastic pull with three color options.
   c. 10mm diameter 96mm o/c rod pull with eighteen (18) color options.

2. Hinges: (See 2.04.C for test criteria) Hinges shall be .95" steel five-knuckle hospital-tip institutional grade quality with .187" diameter tight pin. Residential, kitchen type, pivot, plain butt or hinges with removable pins "SHALL NOT BE ACCEPTABLE". Each hinge shall be secured with a minimum of eight no.8 screws. Hinge shall permit door to swing 270 degrees without binding. Doors less the 48" in height shall have two hinges. Doors over 48" in height shall have three hinges. Finish shall be Greystone, Light Beige, or P.C. Chrome.

3. Drawer Slides:
    a. Drawers: Self closing, bottom mount epoxy coated with captive roller and positive in stop. Slide shall have 100# rating, must be self-closing within last 3” of travel and must prevent fronts from contacting the cabinet body.
    b. File Drawers: Full extension, bottom mount, epoxy coated with captive roller and positive instep. Slide shall have 100# rating, must be self-closing within last 3” of travel and must prevent fronts from contacting the cabinet body.
    c. File drawers shall be equipped with “Pendaflex” file frames.

4. Door Catches:
    a. Base and Wall Cabinets: 7 pound magnetic catch.
    b. Tall Cabinets: Heavy duty spring loaded roller catch with molded plastic bumper/strike, at top and bottom of door.

5. Adjustable Shelf Support:
    a. Shelf supports shall be injected molded plastic, with a double pin engagement 32 mm on center. Shelf supports shall have molded locking tabs for both 1" and 3/4" shelves to prevent shelves from tipping.

6. Locks shall be installed on all doors and drawers.
    a. National Lock five disc tumbler cam locks in chrome finish.
    b. Keyed alike, or keyed differently and master keyed.
    c. Lock core is removable with a control key, permitting Owner to easily change lock arrangements without tools.
    d. Inactive door of base and wall cabinets shall secure using an elbow catch or a chain bolt for tall cabinets.
    e. Provide eight pin locks.

7. Wardrobe Hanger Rod:
    a. 1 inch diameter plated steel with captive sockets.

8. Garment Hooks:
    a. Single prong and double prong clear-anodized aluminum as manufactured by Ives.

9. Mirrors:
    a. Teachers wardrobe mirrors to be 8” x 10” and attached with plastic mirror clips and plate screws.

10. Aluminum pencil proof grilles, as noted on drawings.

11. Toe kick vents, as noted on drawings.

2.03 CONSTRUCTION

A. All cabinet body components shall be secured utilizing concealed interlocking mechanical fasteners as approved by Architectural Woodwork Quality Standards 6th Edition - 1994 Sections 1600A-S-10 and AWI 1600B-S-9. Also, as approved by the Woodwork Institute of California's "Manual of Millwork" Section 15.IX.A.e and shall be especially designed for use in joining particleboard panels.

B. All joints are tight fitting and will not rupture or loosen due to:

1. Dimensional changes in the particleboard.

2. Racking of casework during shipment and installation.

3. Normal use.

4. Seismic shock as tested and approved by the Woodwork Institute of California for casework used in schools and hospitals.

C. All fastening devices and screws shall be treated to deter or resist corrosion.

D. Construction Features:

1. All Cabinets:
   a. All structural components shall be 3/4 inch and 1 inch thick particleboard with balanced surfaces.
   b. All back panels shall be 1/2" thick particleboard surfaced both sides for balanced construction. Backs shall be routed into end panels. Stapled backs or backs not routed in will not be accepted.
   c. All drawer components shall be 1/2 inch thick particleboard with balanced construction.
   d. Back stretchers are 3/4 inch thick structural components mechanically fastened to end panels, and are concealed behind the back panel to:
      1) Provide a means of securely anchoring cabinets to walls.
      2) Provide additional strength by tying the end panels together behind the back.
      3) Plastic back stretchers or hanging strips are not acceptable.
   e. When cabinets are exposed; a full 3/4 inch thick decorative laminate panel shall be substituted for stretchers.
   f. Individually attached exterior grade plywood bases for base cabinets and tall cabinets shall support and carry the load of the end panels, and the cabinet bottoms, directly to the floor. The base shall be let in from the sides and back of the cabinet to allow cabinets to be installed tightly together against a wall, and to conceal the top edge of the applied vinyl base molding. There shall be an intermediate support for all bases 30 inches and wider. End panels continuous to the floor will not be accepted. All bases to be 3/4 inch exterior grade plywood.

g. Horizontal parting rails between drawers shall be 3/4 inch particleboard with balanced surfaces, secured to and further reinforcing cabinet ends. When drawer stacks are keyed individually the parting rail shall run full depth of the cabinet to prevent pilfer.
h. A 5mm diameter row hole pattern 32 mm, (1-1/4"), on center shall be bored in cabinet ends for adjustable shelves. This row hole pattern shall also serve for hardware mounting and locating to create ease of replacement and/or relocation of cabinet components.
i. All door and drawer fronts and finished ends shall be balanced construction with "high-pressure" laminate bonded to both sides of a M-3, 47# particleboard core.
j. Adjustable shelves shall be particleboard core, balanced surfaces and have a .020 inch thick PVC front edge matching the shelf.
    1) Adjustable shelves over 30 inches wide shall be 1 inch thick.
    2) All adjustable shelves in open cabinets shall be 1 inch thick.
    3) All other shelves shall be 3/4 inch thick.
k. Fixed interior components such as fixed shelves, dividers, and cubicle compartments shall be full 3/4 inch thick particleboard attached with concealed interlocking mechanical fasteners.
    1) All doors shall be a maximum of 24 inches wide.

E. Wall Cabinets:

1. Each end panel to be secured with a minimum of seven interlocking mechanical fasteners for a total tensile strength of 2,450 pounds.

2. All wall cabinet bottoms shall be of 1 inch thick particleboard core mechanically fastened to end panels and secured to the bottom back stretcher.

3. An upper 3/4 inch thick stretcher shall be located behind the back panel with two interlocking mechanical fasteners per end and secured to the cabinet top with #8 x 2 inch plated flat head screws. Plastic stretchers or hanging strips are not acceptable.

4. A lower 3/4 inch thick stretcher shall be located behind the back panel and attached to the end panels with interlocking mechanical fasteners. Plastic stretchers or hanging strips are not acceptable.

F. Base Cabinets:

1. Each end panel to be secured with a minimum of seven interlocking mechanical fasteners for a total tensile strength of 2,450 pounds.

2. All base cabinets, except sink cabinets, shall have a solid 3/4 inch thick sub-top fastened to the ends with interlocking mechanical fasteners.

3. All sink cabinets shall have a vertical front stretcher panel above the door/s to support the countertop, a split removable back panel, and four steel corner gussets used to secure the countertop to the sink cabinet.

4. An upper 3/4 inch thick stretcher shall be located behind the back panel and attached to the end panels with interlocking mechanical fasteners. This stretcher is also fastened to the full sub-top thus capturing the back panel. Plastic stretchers or hanging strips are not acceptable.

G. Drawers:

1. Drawer box shall be constructed with a full 1/2 inch thick non-racking, non-deflecting platform which is carried directly by “L” shaped, bottom mount drawer glides. Sides shall be secured with 1-1/2 inch long screws directly into platform and into the sides.

2. Sides, back, sub-front, and bottom shall be 1/2 inch thick 47 pound density particleboard surfaced both faces with White, Light Beige, or Grey Stone thermafused melamine per 2.02.B.1. The top edge shall be banded with .020 inch PVC, matching the drawer color.

3. Joints at all four corners shall be with fluted wood dowels and glue, minimum 32 mm o/c.

4. Drawer fronts shall be removable and attached to drawer box sub-front with screws from inside of drawer.

H. Tall Cabinets:

1. Each end panel to be secured with a minimum of eleven interlocking mechanical fasteners for a total tensile strength of 3,850 pounds.

2. An intermediate fixed shelf shall be provided on all general storage cabinets to maintain internal dimensional stability under heavy loading conditions.

3. A ¾” top and intermediate stretcher shall be located behind the back panels and attached to the end panels with interlocking mechanical fasteners.

4. The intermediate stretcher is secured to the intermediate shelf, thus capturing the back panel, with #8 x 2” plated flat head screws.

5. Plastic back stretchers or hanging strips are not acceptable.

2.04 PERFORMANCE

A. Laminates:

1. "High Pressure Laminates" shall meet the definition and performance requirements of NEMA LD3-1995. Vertical grade laminate shall be GP-28 balanced with a minimum grade of CL-20. Countertops shall be GP-50.

B. Hinges:

1. ANSI 156.9.4.1 through .4: Two hinges mounted 23 inches on center on a 23-7/16 inch wide x 19-11/16 inch high cabinet door shall be capable of supporting a 100 pound test load located 1 inch from the outside edge of the door.
   a. Cycle, open and close, from 5 degrees open through 95 degrees open with no failure to hinges, door, or cabinet end panel.
   b. The maximum horizontal permanent hinge set shall not exceed .030".

C. Drawers:

1. ANSI 156.4.11: A production drawer box 21-5/16 inch wide x 20-3/4 inch deep x 3-7/8 inch high with an applied finished front 6-7/16 inch high x 23-1/8 inch wide with 20 inch drawer slides shall be tested as follows:
   a. When uniformly loaded with 100 pounds and tested through 100,000 opening and closing cycles, the drawer shall operate freely.
   b. When the drawer is fully extended, a 100 pound load shall be supplied to the drawer front at a point on the centerline of the drawer for one minute. No permanent damage or distortion shall occur.

2. ANSI/BHMA A156.9-88, Section 4.11: A production drawer box 21-5/16 inch wide x 20-3/4 inch deep x 3-7/8 inch high with an applied finished front 6-7/16 inch high x 23-1/8 inch wide with 20 inch drawer slides shall be tested as follows:
   a. Cycle Test: When uniformly loaded with 50 pounds and tested through 50,000 opening to two thirds of total travel length and completely closing cycles, the drawer shall operate freely.
   b. Edge Load Test: After completion of Cycle Test, drawer to be opened to one half of the total travel length and apply 75 pounds to edge of drawer for one minute. No permanent damage or distortion shall occur.

D. Door Catches:

1. ANSI A156.9.5: Holding power and cycle test: Catches shall retain at least 50% of the rated minimum pull at test completion.
   a. Heavy Duty Magnetic or Heavy Duty Roller-100,000 cycles of full engagement and disengagement.

E. Adjustable Shelving:

1. When supported only at the ends, shelving shall not deflect in excess of 1/4 inch when loaded as follows:
   a. Standard Shelving - 25 pounds/square foot.
   b. Library Shelving - 40 pounds/square foot.

2. ANSI A156.9.4.10 place a 3/4 inch x 10-1/4 inch x 34-1/8 inch shelf on four shelf supports in a 36 inches wide wall cabinet. A 300 pound uniformly applied load without bridging effect shall be sustained without failure or damage to the shelf, shelf supports, or cabinet end panels.

F. Wall Hung Cabinet Load Test:

1. Earthquake test procedure developed by the "Woodwork Institute of California" for casework used in California schools and hospitals.
   a. A 48 inch high x 12 inch deep x 48 inch wide wall hung cabinet using interlocking mechanical fastening devices shall support a 2,000 pound dead load concurrently with a 982 pound lateral pull out load. Test complies with loads specified in Title 17 with a safety factor of two.

2.05 COUNTERTOPS

A. High-Pressure Decorative Laminate:

1. General Purpose Grade, GP-50 high-pressure laminate on horizontal surface and edges, conforming to NEMA Standard LD3-1995. Exposed edges of countertops to have 3mm PVC edge styling available in same 22 colors as cabinet 3mmPVC.

2. Laminates bonded to 1-1/8 inch thick 47# particleboard. Core shall be balanced with HPL backer. All countertops to be laminated with PVA adhesive and a cold press method resulting in a rigid glue line. Contact adhesive method of laminating will not be allowed. Countertops to have .020 PVC edging on back-concealed edge applied with hot melt adhesive. No exposed particle board surfaces whether concealed or not will be permitted.

3. All joints shall be secured with adhesives and tight joint fasteners and shall be located no closer than 4' from sinks.

4. Provide 4 inch high splashes as required. Bottom of back and end splashes to have .020 PVC edge hot melted to prevent water absorption. Seal joint between splash and countertop with silicone. Splashes to have backer sheet on surface against wall.

5. Countertops shall conform to ANSI A161.2-1979 "Performance Standards for Fabricated High-Pressure Decorative Laminate Countertops"

B. Solid Surface Countertops: Refer to Specification Section 12 36 61.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Casework shall not be delivered to or stored at the job site until building has become adequately dry and secure. The ambient relative humidity must be maintained between 25% and 55% prior to delivery.

B. Installation shall be by manufacturer's authorized representative.

C. Casework shall be installed plumb and true, and securely anchored in place. Scribe casework fillers as required to form a tight fit.

D. Wall cabinets shall be securely fastened to horizontal blocking, not to plaster, lath or gypsum board. Reinforcement of stud walls shall be provided by appropriate trade during erection of walls. Casework manufacturer shall accurately locate blocking requirements on shop drawings.

E. Use fixture attachments in concealed locations for wall mounted components.

F. Use concealed joint fasteners to align and secure adjoining cabinet units, counter tops and cubbies.

G. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

H. Secure cabinet and counter bases to floor using appropriate angles and anchorages.

I. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

J. Install wall cabinets with fasteners @ 1'-0" O.C., min. of four fasteners per cabinet.

K. Install service fixtures in accordance with manufacturer's instructions.

L. Install in accordance with standards required by authority having jurisdiction.

M. Anchor equipment securely in place.

N. Sequence installation of service and electrical fixtures to insure utility connections are achieved in an orderly and expeditious manner.

O. Laboratory equipment contractor shall securely set in place all sinks and fixtures supplied under this section. Plumbing contractor shall be responsible for all piping, traps, and final connections of utilities.

3.03 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork where possible to eliminate functional and visual defects; where not possible to repair, replace. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

D. Empty drawers of dirt and dust. Wipe out cabinets' interiors to remove dirt and dust. Remove pencil or other marks, excess adhesive, etc. from cabinets and countertops. Remove all packaging, scraps, and debris resulting from casework installation activities.

E. Make final adjustments to doors and drawers. Doors shall swing freely, catches shall hold securely, and all other doors shall be aligned both vertically and horizontally. Drawers shall open and close smoothly, without binding and without excessive slide play. All locks should work, smoothly and freely without binding or catching.

F. Keys shall be appropriately labeled and turned over to the Owner.

3.04 CABINET SCHEDULE

A. Base Units:

1. Type PB-3 - Base Storage with Doors: Furnish with one adjustable shelf and two hinged doors. Height, depth and width as indicated on drawings. Similar to Case Systems Model #B0100.

2. Type PB-6.2 – Base storage with Doors and Drawers: Furnish with one adjustable shelf, two hinged doors, and two half-width drawer at top. Height, depth and width as indicated on drawings. Similar to Case Systems Model #B3100

3. Type PB-14 - Wheelchair Accessible Sink Cabinet: Furnish with two hinged doors, and no bottom. Height = 34", depth and width as indicated on drawings. Similar to Model #B2800. Refer to drawings for additional information on accessibility requirements.

B. Wall Units:

1. Type PW-3 - Wall storage with Doors: Furnish with one adjustable shelf in cabinets 30”H or under and two adjustable shelves in cabinets over 30”H. Height, depth and width as indicated on drawings. Similar to Case Systems Model #W0100.

C. Tall Units:

1. Type PT-3 - Tall Storage with Doors: Furnish with four adjustable shelves, one fixed centered shelf and two hinged doors. Height, depth and width as indicated on drawings. Similar to Case Systems Model #T0100.

D. Hutch Units:

1. Type PH-1: Open Mail Cubicle: Furnish (30) thirty fixed shelves, and one fixed vertical partition. Height, depth and width as indicated on drawings. Similar to Case Systems Model #H1700.

END OF SECTION

SECTION 12 36 61

SOLID SURFACING COUNTERTOPS

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid surface material countertops

2. Solid surface material backsplashes.

3. Solid Surface material end splashes.

1.3 SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.

2. Show direction of directional pattern, if any.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:

1. Countertop material, 4 inches square.

E. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.6 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

2 PART 2 PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Wilsonart Corporation
   b. Formica Corporation.
   c. Corian by DuPont

2. Type: Provide Standard type unless Special Purpose type is indicated.

3. Colors and Patterns: As selected by Architect from manufacturer's full range, all price groups.

4. Performance Characteristics:
   a. Solid Surface Based Products:

Property	Requirement (min or max)	Test Procedure
Tensile Strength	6000 psi min	ASTM D638
Tensile Modulus	1.5×10^6 psi min	ASTM D638
Tensile Elongation	0.4% min.	ASTM D638
Flexural Strength	10000 psi min	ASTM D790
Flexural Modulus	1.2×10^6 psi min	ASTM D790
Hardness	60	ASTM D 2583
Thermal Expansion	1.37×10^{-5} in./in./°F	ASTM D 696
Fungi and Bacteria	Does not support microbial growth.	ASTM G21 & G22
Microbial Resistance	Highly resistant to mold growth	UL 2824
Ball Impact	No fracture – ½ lb. Ball: 6 mm slab – 36” drop; 12 mm slab – 144” drop	NEMA LD 3, Method 3.8
Weatherability	AE*94<5 in 1,000 hrs.	ASTM G155
Flammability	Class 1 and Class A	ASTM E84, NFPA 255 & UL 723

	All Colors		
Property	**6 mm**	**12 mm**	**Test Performance**
Flame Spread	<25	<25	
Smoke Developed	<25	<25	
Class	A	A	NFPA 101®, Life Safety Code

B. Solid Surface Material: Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment; not coated, laminated or of composite construction; meeting following criteria:

1. Flammability: Class 1 and A when tested to UL 723.

C. Particleboard: ANSI A208.1, Grade M-2.

D. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

B. Configuration:

1. Front: Straight, slightly eased at top.

2. Backsplash: Straight, slightly eased at corner

3. End Splash: Matching backsplash.

C. Countertops: 1/2-inch- thick, solid surface material with front edge built up with same material.

D. Backsplashes: 1/2-inch-thick, solid surface material.

E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

2. Install integral sink bowls in countertops in the shop.

F. Joints: Fabricate countertops without joints.

G. Joints: Fabricate countertops in sections for joining in field, with joints at locations indicated.

1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.

2. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints where indicated. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.

H. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
   a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
   b. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.
   c. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.

2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.

3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.

1. Adhesives shall have a VOC content of 70 g/L or less.

B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Fasten subtops to cabinets by screwing through subtops into corner blocks of base cabinets. Shim as needed to align subtops in a level plane.

D. Fasten subtops to cabinets by screwing through subtops into corner blocks of base cabinets. Shim as needed to align subtops in a level plane.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears

1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.

2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

I. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION

DIVISION 13-21 – NOT USED

DIVISION 22 - PLUMBING

SECTION 22 05 27

PIPE SLEEVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install pipe sleeves, other wall pieces, and escutcheons complete with accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the pipe sleeves Work.

2. Notify other contractors in advance of the installation of the pipe sleeves system to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the pipe sleeves Work.

C. Related Sections:

1. Section 03 01 00, Maintenance of Concrete.

2. Section 07 92 00, Joint Sealants.

3. Section 22 11 16, Domestic Water Piping.

4. Section 22 13 16, Sanitary Waste and Vent Piping.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American National Standards Institute, (ANSI).
   a. ANSI A21.4, Cement-Mortar Lining for Cast-Iron and Ductile Iron Pipe and Fittings.
   b. ANSI A21.6, Cast-Iron Pipe Centrifugally Cast in Metal Molds.
   c. ANSI A21.10, Cast-Iron and Ductile Iron Fittings, 2 thru 48-inches in Water.
   d. ANSI A21.11, Rubber Gasket Joints for Cast-Iron and Ductile Iron Pressure Pipe.
   e. ANSI A21.15, Flanged Cast-Iron and Ductile Iron.
   f. ANSI A21.51, Ductile Iron Pipe Centrifugally Cast in Metal Molds.

g. ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings.

2. American Water Works Association, (AWWA).
   a. AWWA C104, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
   b. AWWA C106, Cast-Iron Pipe Centrifugally Cast in Metal Molds.
   c. AWWA C110, Ductile-Iron and Gray-Iron Fittings for Water.
   d. AWWA C111, Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   e. AWWA C115, Flanged Ductile-Iron Pipe or Gray-Iron Threaded Flanges.
   f. AWWA C151, Ductile-Iron Pipe, Centrifugally Cast for Water.

1.3 QUALITY ASSURANCE

A. Installers' Qualifications:

1. Engage a single installer regularly engaged in pipe sleeves and mechanical seals installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit names and qualifications to ENGINEER.

2. Engage a single installer for the entire pipe sleeves and mechanical seals system with undivided responsibility for performance and other requirements.

B. Component Supply and Compatibility:

1. Obtain all products included in this Section regardless of the component manufacturer from a single pipe sleeves and mechanical seal manufacturers.

2. The pipe sleeves and mechanical seal manufacturers to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the pipe sleeves and mechanical seal manufacturers.

C. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Local and State Building Codes and Ordinances.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following:

1. Manufacturer's literature, illustrations, specifications and engineering data.

2. Details of installation.

3. Detailed drawings showing all pipe sleeves and mechanical seals for each piping system. Drawings shall show location, installation and material of all pipe sleeves and mechanical seals.

4. Other technical data related to the specified material and equipment as requested by ENGINEER.

5. Installer's Qualifications.

6. Deviations from Contract Documents.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer’s instructions.

1.6 GENERAL REQUIREMENTS

A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.

B. The Drawings show an indication of the arrangement of equipment, piping, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. Piping, equipment, piping, etc. found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case, adequately provide for expansion and circulation and minimize the amount of space required for the same.

D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, CONTRACTOR, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the ENGINEER.

E. The Drawings do not show all offsets, fittings, accessories and details, which may be required. CONTRACTOR shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe Sleeves:

1. Ferrous and Plastic Pipe: Use standard weight galvanized steel pipe, unless otherwise shown.

2. Copper Pipe: Use standard weight galvanized steel pipe with mechanical link seals as spacers, unless otherwise shown.

B. Cast Wall Sleeves:

1. Material: Cast-iron furnished with integral wall collar.

2. Dimensions: As required for mechanical joint or calked joint pipe to pass through sleeve. Length as required.

C. Mechanical Seals: Provide link type mechanical seals with adjusting bolts suitable for 20 psi working pressure where shown or required.

1. Manufacturers: Provide products of one of the following:
   a. Advance Products & Systems, Inc., Innerlynx.
   b. GPT Division of Enpro Industries, Link-Seal.
   c. The Metraflex Company, Metraseal.
   d. Or equal.

2. Materials: Mechanical seals through non-fire rated walls or floors:
   a. Pressure Plate: Glass reinforced nylon plastic.
   b. Bolt and Nut: 18-8 stainless steel.

c. Sealing Element: EPDM rubber.
d. Fire Rating: None.
e. Listing: UL

3. Materials: Mechanical seals through fire rated walls or floors; two independent mechanical seal assemblies required for each penetration:
   a. Pressure Plate: Low carbon steel, zinc galvanized plated or stainless steel.
   b. Bolt and Nut: Low carbon steel zinc galvanized or stainless steel.
   c. Sealing Element: Silicone rubber.
   d. Fire rating: Three-hour.
   e. Listing: UL.

D. Wall, Floor and Ceiling Escutcheon Plates:

1. Manufacturers: Provide products of one of the following:
   a. McGuire Manufacturing, Inc.
   b. Pegasus Manufacturing, Incorporated.
   c. Or equal.

2. Bare Pipes Passing Through Walls, Floors and Ceilings in any Room: Provide escutcheon plates of cast brass or stamped steel, chrome plated, hinged with setscrews.

3. Insulated Pipes Passing Through Walls, Floors and Ceilings in Finished Rooms: Provide plated escutcheon plates of stamped steel or cast brass, chrome plated, hinged with setscrews.

E. Exterior Walls or Floors: Below grade:

1. Manufacturers: Provide products of one of the following:
   a. GPT Division of Enpro Industries, Century-Line.
   b. SIGMA Corporation, Omni-Sleeve.
   c. Or equal.

2. Type: Thermoplastic sleeve for use in new construction where sleeves are exposed to liquid or on exterior walls or floors exposed to backfill only.

3. Integral reinforcing ribs, anchor and waterstop collar textured surface for adhesion to concrete.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install all items as shown, specified, and as recommended by the manufacturer.

2. Request instructions from ENGINEER, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.

3. Present conflicts to ENGINEER, in writing, who will determine corrective measures to be taken.

4. Do not modify structures to facilitate installation of pipe sleeves, mechanical seals, and accessories, unless specifically approved by ENGINEER.

5. Installation to conform to requirements of all local and state codes.

6. Protection: Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

B. Pipe Sleeves:

1. Use sleeves wherever pipes pass through walls, partitions, floors and roofs, unless otherwise shown.

2. All sleeves through floor slabs in finished areas shall extend a maximum of 1/4-inch above finished floor.

3. Anchor sleeves to concrete and masonry walls as shown or otherwise accepted.

4. Sleeves through walls shall be flush with wall face.

5. Calk and seal annular space between pipe and sleeve.

6. All pipe joints and annular spaces in exterior walls or walls subjected to hydrostatic pressure shall be completely watertight.

7. All vertical pipes through sleeves shall be installed with Link Seal "Pyro-Pacs" to maintain 2-hour fire rating between the two fire areas.

8. Size Sleeves to provide annular space as recommended by the mechanical seal manufacturer and as follows:

Pipe Size	Sleeve ID Minus Pipe or Insulation OD
Less than 2-in.	1/2-in. to 3/4-in.
2-in. to 4-in.	3/4-in. to 1-1/4-in.
6-in. to 12-in.	1-1/4-in. to 2-in.

9. For mechanical link seals, size sleeves to provide space required to suit link type seals provided.

10. Do not install sleeves and pipes through structural members unless specifically required due to coordination or obstructions, each sleeve condition shall be submitted for approval.

3.2 FIELD QUALITY CONTROL

A. Inspection:

1. Examine areas to receive pipe sleeves, mechanical seals, escutcheons and accessories for:
   a. Defects that adversely affect execution and quality of the Work.
   b. Deviations beyond allowable tolerances for pipe sleeves, mechanical seals, escutcheons and accessories.
   c. Start the Work only when conditions are satisfactory.

2. The ENGINEER reserves the right to reject or authorize replacement of pipe sleeves, mechanical seals, escutcheons and accessories found to be defective.

3.3 ADJUSTING AND CLEANING

A. Adjusting:

1. Adjust all materials for proper settings.

B. Cleaning:

1. Thoroughly clean all pipe sleeves, mechanical seals, escutcheons and accessories prior to installation.

2. Remove all dirt, rust, dust, etc. from all pipe sleeves, mechanical seals and escutcheons in preparation for required painting.

3. Remove and dispose of all debris and waste from the Site resulting from installation.

END OF SECTION

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install hangers and supports complete with accessories for plumbing piping and equipment.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the hangers and supports for plumbing piping and equipment Work.

2. Notify other contractors in advance of the installation of the plumbing pipe and equipment hangers and supports to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the plumbing piping and equipment hangers and supports Work.

C. Related Sections:

1. Section 05 50 00, Metal Fabrications.

2. Section 09 90 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American National Standards Institute, (ANSI).
   a. ANSI B1.1, Unified Inch Screw Threads. (ASME B1.1).

2. American Society for Testing and Materials, (ASTM).
   a. ASTM A 36/A 36M, Specification for Carbon Structural Steel.
   b. ASTM A 47/A 47M, Specification for Ferritic Malleable Iron Castings.
   c. ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

d. ASTM A 575, Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
e. ASTM A 668/A 668M, Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.

3. Federal Specifications, (FS).
   a. FS WW-H-171, Hangers and Supports, Pipe.

4. Manufacturer's Standardization Society, (MSS).
   a. MSS SP 58, Pipe Hangers and Supports - Materials, Design and Manufacture.
   b. MSS SP 69, Pipe Hangers and Supports - Selection and Application.
   c. MSS SP 89, Pipe Hangers and Supports - Fabrication and Installation Practices.
   d. MSS SP 90, Guidelines on Terminology for Pipe Hangers and Supports.

1.3 QUALITY ASSURANCE

A. Installer's Qualifications:

1. Engage a single installer regularly engaged in hangers and supports installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to ENGINEER.

2. Engage a single installer for the entire plumbing pipe and equipment hangers and supports system with undivided responsibility for performance and other requirements.

B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Local and State Building Codes and Ordinances.

2. Permits: CONTRACTOR shall obtain and pay for all required permits, fees and inspections.

C. Component Supply and Compatibility:

1. Obtain all products included in this Section regardless of the component manufacturer from a single plumbing pipe and equipment hangers and supports manufacturer.

2. The plumbing piping and equipment hangers and supports manufacturer shall review and approve all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the plumbing piping and equipment hangers and supports manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Details of installation.
   b. Detailed drawings showing all hangers and supports for each piping system. Drawings shall show location, installation, material, loads, forces, stresses and deflections of all hangers and supports.

2. Product Data:
   a. Manufacturer's literature, illustrations, specifications and engineering data.
   b. Other technical data related to the specified material and equipment as requested by ENGINEER.

B. Informational Submittals: Submit the following:

1. Qualifications Statements:
   a. Installer's Qualifications.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer’s recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 GENERAL REQUIREMENTS

A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.

B. The Drawings show an indication of the arrangement of equipment, piping, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. Piping, equipment, etc. found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case, adequately provide for expansion and circulation and minimize the amount of space required for the same.

D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, CONTRACTOR, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the ENGINEER.

E. The Drawings do not show all offsets, fittings, accessories and details, which may be required. CONTRACTOR shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 GENERAL

A. Components of hangers and supports shall conform to the following:
   a. Materials:
   b. Bolts: ASTM A 307, Grade A, unless otherwise specified below.
   c. Forgings: ASTM A 668/A 668M.
   d. Malleable Iron: ASTM A 47/A 47M.
   e. Rods and Bars: ASTM A 575.
   f. Threads: Unified Screw Threads, Class 2A and 2B, ANSI B1.1.
   g. Structural Steel: ASTM A 36/A 36M.

   2. Finish:
      a. Steel or Malleable Iron Items: Galvanized, unless otherwise specified or as shown.
      b. Steel or Malleable Iron Materials Used for the Support of Uninsulated Copper Piping: Copper plated.
      c. Framing Members and Fittings: Dip painted with corrosion resistive primer as specified in Section 09 90 00, Painting.
      d. All hangers, rods, bolts, nuts, inserts, washers located in the corrosive areas shall be Type 316 stainless steel.

B. Pipe Attachments: The following types of pipe attachments shall be considered acceptable:

   1. Adjustable Steel Clevis: FS WW-H-171E, Type 1.

   2. Steel Double Bolt Pipe Clamp: FS WW-H-171E, Type 3.

   3. Steel Pipe Clamp: FS WW-H-171E, Type 4.

   4. Adjustable Swivel Pipe Ring: FS WW-H-171E, Type 6.

   5. Adjustable Steel Band Hanger: FS WW-H-171E, Type 7.

   6. Riser Clamp: FS WW-H-171E, Type 8.

   7. Light-Duty Cleves Hanger: FS WW-H-171E, Type 12.

   8. Long Clips: FS WW-H-171E, Type 26.

   9. Offset J-Hooks: FS WW-H-171E, Type 27.

   10. Steel Pipe Covering Protection Saddle: FS WW-H-171E, Type 40A.

   11. Insulation Protection Shield: FS WW-H-171E, Type 41.

   12. Pipe Saddle Support: FS WW-H-171E, Type 37.

13. Pipe Stanchion Saddle: FS WW-H-171E, Type 38.

14. Pipe Saddle Support with Base: FS WW-H-171E, Type 36.

15. Adjustable Roller Hanger: FS WW-H-171E, Type 42.

C. Structural Attachments: The following types of structural attachments shall be considered acceptable:

1. Side Beam Clamp: FS WW-H-171E, Type 20.

2. Center I-Beam Clamp: FS WW-H-171E, Type 21.

3. Welded Steel Bracket: FS WW-H-171E, Types 32 and 33.

4. Side Beam Bracket: FS WW-H-171E, Type 35.

5. Malleable Iron with Galvanized Finish Concrete Insert: FS WW-H-171E, Type 18. The use of steel concrete inserts is prohibited and NOT acceptable.

D. Hanger Rod Attachments: Use as required to complete assembly:

1. Forged Steel Clevis: FS WW-H-171E, Type 14.

2. Adjustable Turnbuckle: FS WW-H-171E, Type 15.

3. Forged Steel Welders Eye Nut: FS WW-H-171E, Type 17.

E. Alignment Guides:

1. Type: Semi-steel spider with four guiding fingers and guilding cylinder with base.

2. Manufacturers: Provide products of one of the following:
   a. Flex-Hose Co., Inc.
   b. The Metraflex Company
   c. Or equal.

F. Connection Bolts: Materials shall be as specified in other Sections of these Specifications or as shown. Where materials are not specified or shown, they shall be of Type 304 stainless steel with Monel nuts.

G. Toggle Bolts:

1. Provide zinc plated spring wing toggle bolts of the size required for secure anchorage of individual items, but not less than 1/4-inch diameter, of length required.

2. Products and Manufacturers: Provide products by one of the following:
    a. Cooper B-Line Division of Eaton Corp.
    b. Powers Fasteners
    c. Or equal.

H. CONTRACTOR shall furnish and install all necessary supports, angle iron stands, miscellaneous steel, inserts, anchor bolts and hangers required for all equipment furnished under this Contract, unless otherwise noted. All supports shall meet the requirements of the applicable Sections of Division 05, Metals.

2.2 PAINTING

A. All pipe hangers, supports and restraints shall be painted as required in accordance with the requirements of Section 09 90 00, Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install all items as shown, specified, and as recommended by the manufacturer.

2. Request instructions from ENGINEER, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.

3. Present conflicts to ENGINEER, in writing, who will determine corrective measures to be taken.

4. Do not modify structures to facilitate installation of pipe hangers, supports and restraints, unless specifically approved by ENGINEER.

5. Installation to conform to requirements of all local and state codes.

6. Protection: Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.2 FIELD QUALITY CONTROL

A. Inspection:

1. Examine areas to receive plumbing piping and equipment hangers and supports and accessories for:
   a. Defects that adversely affect execution and quality of the Work.
   b. Deviations beyond allowable tolerances for pipe hangers, supports and restraints and accessories.
   c. Start the Work only when conditions are satisfactory.

2. The ENGINEER reserves the right to reject or authorize replacement of pipe hangers, supports and restraints and accessories found to defective.

3.3 ADJUSTING AND CLEANING

A. Adjusting:

1. Adjust all materials for proper settings.

B. Cleaning:

1. Thoroughly clean all pipe hangers, supports and restraints and accessories prior to installation.

2. Remove all dirt, rust, dust, etc. from all pipe hangers, supports and restraints in preparation for required painting.

3. Remove and dispose of all debris and waste from the Site resulting from installation.

3.4 MATERIAL SCHEDULES

A. Hangers, Supports and Restraints for Horizontal Piping:

1. Space supports and hangers for all piping no farther apart than shown below, unless otherwise shown:
   a. Copper Tube:
      1) All Pipes: 6 feet-0 inch on center.
   b. Steel Pipe:
      1) Pipes up to 1-inch: 6 feet-0 inch on center.
      2) Pipes 1-1/4-inch to 6-inch: 8 feet-0 inch on center.
   c. Cast-Iron Pipe:
      1) Two supports per length, maximum 5 feet-0 inches on center.

d. Plastic Pipe:
   1) 3 feet-0 inch on center for all sizes, unless otherwise recommended by manufacturer for 100°F ambient temperature.

2. Additional supports are to be provided at all changes of direction, at all no-hub fittings and couplings for cast iron pipe, and at all valves or other in-line devices installed in piping.

3. Rigid support sway bracing shall be provided at all changes of direction for piping 4" diameter and larger.

4. Mechanical restraints shall be installed at all fittings for changes of direction in drainage piping 4" and larger in accordance with the CISPI installation guidelines.

B. Hanger Rods: Size hanger rods according to the schedule below, unless noted otherwise.

Nominal Pipe (Inches)	Rod Diameter (Inches)
1/2 through 2	3/8
2-1/2 through 3-1/2	1/2
4 through 5	5/8
6	3/4

C. Supports for Vertical Piping:

1. Provide riser clamp placed under hub, fitting or coupling with approved solid bearing on steel sleeve at each floor level.

2. Where riser clamps are used with plastic piping they shall be modified so as not to exert any compressive forces on the pipe.

3. Support spacing shall not exceed code requirements.

4. Piping support intervals shall not exceed those listed in Paragraph 3.4.A., above.

5. Additional supports shall be placed immediately adjacent to any change in piping direction, and on both sides of valves and couplings.

6. Accurately locate inserts for hanger rods in forms before concrete is placed.

7. Use Type 304 stainless steel expansion anchor assemblies of the capsule polyester resin adhesive type and only to support rods, hangers and brackets for piping 1-inch and smaller no other type will be considered and only if the expansion anchors are designed to carry 100 percent of the full load, hanger, and/or bracket and pipe load.

D. Structural members shall conform to Section 05 50 00, Metal Fabrications.

E. Allow clearances for expansion and contraction of piping.

F. Anchors shall be designed to prevent any pipe movement at pipe anchorage points. Anchors shall be securely fastened to the construction directly or indirectly through structural framing:

1. Piping 2-1/2-inches and Smaller: Anchor horizontal runs over 50 feet to midpoint to allow expansion toward expansion compensators (anchor intervals shall not exceed 30 feet) or elbows.

2. Piping 3-inches and Larger: Anchor horizontal runs over 100 feet at mid-points to force expansion toward expansion compensators.

3. Provide alignment guides in accordance with expansion compensator manufacturer recommendations.

G. Locate first set of alignment guides within four pipe diameters of the anchor or expansion compensator, the second set of pipe alignment guides shall be located within fourteen pipe diameters of the first guides.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION OF PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install pipe labels, stencils, valve tags, equipment plates, and other identification specified herein.

B. Related Sections:

1. Section 22 07 19, Plumbing Piping Insulation.
2. Section 22 11 16, Domestic Water Piping.
3. Section 22 11 23, Domestic Water Pumps.
4. Section 22 13 16, Sanitary Waste and Vent Piping.
5. Section 22 18 00, Natural Gas Piping System.
6. Section 22 33 00, Domestic Water Heaters.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American National Standards Institute (ANSI):
   a. ANSI Z535.1, Safety Color Code
2. American Society of Mechanical Engineers (ASME):
   a. ASME A13.1, Scheme for the Identification of Piping Systems.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience. Submit names and qualifications to ENGINEER.

B. Installer's Qualifications: Contractor specializing in performing work of this section with minimum five years documented experience. Submit names and qualifications to ENGINEER.

C. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Local and State Building Codes and Ordinances.

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

B. Provide the following project specific information:

1. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for plumbing equipment, piping and valve identification.

2. Equipment Label Schedule: Provide a schedule of all equipment to be labeled with the proposed content for each label.

3. Pipe Label Schedule: Provide a schedule of each piping systems indicating a proposed nomenclature and location of all pipe markers.

4. Valve Tag Schedule: Provide a proposed valve numbering scheme and schedule for each piping system. Tabulate valve number, piping system, system abbreviation as shown on tag, room or space location of valve, normal-operating position (open, closed, or modulating), and variations for identification. Mark valves intended for emergency shut-off and similar special uses.

C. Closeout Submittals: Record actual as built locations of valve tags and update schedules accordingly.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect packaged materials from corrosion and deterioration.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 GENERAL REQUIREMENTS

A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.

B. The Drawings show an indication of the arrangement of equipment, piping, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. Piping, equipment, piping, etc. found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

C. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, CONTRACTOR, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the ENGINEER.

D. The Drawings do not show all offsets, fittings, accessories and details, which may be required. CONTRACTOR shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide products of one of the following:

1. Brady North America
2. Brimar Industries, Inc.
3. Marking Services, Inc.

2.2 PIPE MARKERS

A. General:

1. Vinyl or vinyl cloth with permanent, pressure-sensitive adhesive.
2. Provide labels and adhesives of long lasting materials, resistant to moisture, oils, solvents, and weathering.
3. Provide separate flow directional arrows that conform with the above criteria.

B. Piping Labels: Include the full service identifier.

2.3 VALVE TAGS

A. Construction:

1. Material: Brass.
2. Size: 1-1/2-inch diameter.
3. Chain: Brass.
4. Lettering Size: 1/4-inch black filled letters over 1/2-inch high black filled numbers.

B. Legend:

1. C.W. - Cold Water.
2. G - Gas.
3. H.W. - Hot Water.
4. H.W.R. – Hot Water Return

5. B.H.W.S. – Boiler Hot Water Supply

6. B.H.W.R. - Boiler Hot Water Reterun

7. T.W. – Tempered Water

2.4 VALVE CHARTS

A. General:

1. Two required; 1/8-inch sheet acrylic in 8-1/2 by 11-inch extruded aluminum frame.

2. Charts: Typed or inked on mylar with the following information for each valve.
   a. Valve identification number.
   b. Valve location.
   c. Valve use.
   d. Valve size.
   e. Manufacturer's name and model number.

3. Submit sample valve tag with lettering.

2.5 EQUIPMENT NAMEPLATES

A. General: Equipment and motors to be furnished with stainless steel engraved nameplate by manufacturer. In addition, provide an engraved multi-layered plastic laminated nameplate for all plumbing equipment purchased for this project. Provide an additional engraved nameplate for each disconnect and controller connected to the plumbing equipment.

B. Mechanical Equipment: Provide a 1/16” thick black nameplate with white letters for all mechanical equipment. The nameplate shall be a minimum of 3” high x 6” wide. The nameplate shall be engraved with the Equipment Tag as shown on the mechanical drawings and schedules. The minimum letter height shall be 3/4”. If necessary, enlarge the size of the plate to accommodate the ¾” characters. Do not reduce the letter height. The nameplate shall be installed with either double faced adhesive or with stainless steel screws.

C. Disconnects and Controllers: Provide a 1/16” thick black nameplate with white letters for each disconnect or controller connected to the mechanical equipment. The nameplate shall be a minimum of 2” high x 4” wide. Coordinate the information to be engraved on each plate so that it exactly matches the nameplate on the equipment. The minimum letter height shall be ½”. Install these nameplates with 2 mil. Permanent double-faced acrylic adhesive covering the entire surface of the nameplate.

D. Access Panels: Provide a 1/16” thick white nameplate with black letters to identify access to concealed valves or equipment such as those found above acoustical ceilings tiles. The nameplate shall be ¾” high x 2 ½” wide. Coordinate the information to be engraved on each plate so that it exactly matches the valve tag or equipment nameplate. The minimum letter height shall be ¼”. Install these nameplates on the ceiling support to the right of the tile that would provide access. Nameplates should be installed using double faced 2 mil. permanent acrylic adhesive.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install all items as shown, specified, and as recommended by the manufacturer.

2. Clean and prepare all surfaces for attachment of identification and apply adhesive appropriate to the environment.

3. Pipe labels are to be installed over insulation in a visible location for insulated piping.

4. Attach labels on horizontal runs to lower quarter of piping. Labels are to be visible when viewed from below.

5. Install separate flow directional arrows with each pipe label.

6. Identify piping where it is not permanently concealed by the structure:
   a. At each valve.
   b. On both sides of wall, floor, and ceiling penetrations.
   c. On each riser.
   d. On each leg of a tee.
   e. At connections to equipment.
   f. At least every 30-feet along continuous runs of exposed piping. and piping in ceiling spaces that are is accessible through ceiling tiles shall be identified every 10 feet. The distance shall be measured center to center.
   g. At least every 20-feet along continuous runs of compressed gas piping systems. Compressed gas piping systems in ceiling spaces that are accessible through ceiling tiles shall be identified every 10 feet. The distance measured shall be center to center.

7. Securely attach valve tags with brass chain at each valve.

8. Install equipment nameplate at each piece of equipment and at all panels.

3.2 FIELD QUALITY CONTROL

A. Inspection:

1. Examine all runs of piping, all valves, and all equipment to ensure that all piping, valves and equipment are provided with identification described herein.

2. Wherever identification is damaged, defective, or illegible, it is to be repaired or replaced.

3.3 CLEANING

A. Cleaning:

1. Thoroughly clean all labels, tags, and nameplates prior to completion of work.

2. Remove and dispose of all debris and waste from the Site resulting from installation.

END OF SECTION

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install plumbing piping insulation complete with accessories.

2. The Contract Documents show the general arrangement and extent of the Work under this Section. Exact location and arrangement of all parts of the Work under this Section will be determined as the Work progresses. Exact location of the Work under this Section will be governed in part by building layout and conditions at the Site.

3. The Drawings do not show all offsets, fittings, accessories and details, for which insulation Work may be required. After examining the Contract Documents and conditions at the Site for conditions that affect the plumbing piping insulation Work, shall arrange the Work accordingly, providing all items required for such conditions that are not included under other Sections or other contracts to complete the systems.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items that must be installed with or before plumbing piping insulation Work.

2. Notify other contractors in advance of the installation of plumbing piping insulation to provide them with sufficient time for installing items included in their contracts that must be installed with or before plumbing piping insulation Work.

C. Related Sections:

1. Section 22 05 53 - Identification of Plumbing Piping and Equipment.

2. Section 22 11 16 – Domestic Water Piping.

1.2 REFERENCES

1. ANSI A117.1, Guidelines for Accessible and Usable Buildings and Facilities.

2. ASTM C449/C449M, Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finish Cement.

3. ASTM D1784, Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

4. Federal Specification (FS) SS-C-160, Cement, Insulation, Thermal.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
   a. Engage installer regularly engaged in plumbing piping insulation installation and with experience installing the types of materials required; and employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to ENGINEER.
   b. Engage a single plumbing piping insulation installer for entire piping insulation system, with undivided responsibility for performance and other requirements.

B. Component Supply and Compatibility:

1. Obtain all products included in this Section regardless of component manufacturer, from a single piping insulation Supplier.

2. Plumbing piping insulation Supplier shall review and approve or prepare all Shop Drawings and other submittals for components furnished under this Section.

3. Components shall be suitable for specified service conditions and shall be integrated into overall assembly by plumbing piping insulation Supplier.

C. Regulatory Requirements: Comply with the following.

1. Americans with Disabilities Act (ADA).

2. State and Local building codes and ordinances

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:
   a. Manufacturer’s literature, illustrations, specifications, and engineering data.

b. Other technical data related to specified materials as requested by ENGINEER.

B. Informational Submittals: Submit the following:

1. Manufacturer's Instructions:
   a. Manufacturer's recommended installation instructions.

2. Qualifications Statements:
   a. Installer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Deliver products to Site to ensure uninterrupted progress of the Work.

2. Inspect all boxes, crates, and packages upon delivery to Site and notify ENGINEER in writing of loss or damage to products. Promptly remedy loss and damage to new condition per manufacturer's instructions.

3. Conform to Section 01 65 00, Product Delivery Requirements.

B. Storage and Protection:

1. Keep all products off ground using pallets, platforms, or other supports, in covered storage. Protect materials from damage and deterioration.

2. Prevent condensation in materials and packaging in accordance with manufacturer's recommendations for long-term storage

3. Conform to Section 01 66 00, Product Storage and Handling Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fiberglass Insulation:

1. Products and Manufacturers: Provide one of the following:
   a. Owens-Corning Fiberglass Corporation, Fiberglass SSL II with ASJ Max Fiberglass.
   b. Johns Manville Division of Berkshire Hathaway, Micro-Lok HP
   c. Or equal.

2. Type: Heavy-density pre-formed fiberglass sectional pipe insulation with factory-applied indoor foil or polymer jacketing with self-sealing lap.

3. Thermal Conductivity: 0.25-0.29 Btu-inch per hour per square foot per degree F at 125 degrees F mean temperature. Insulation thicknesses shall be as indicated in manufacturer's installation guidelines, except that in no case shall insulation thicknesses be less than required by ASHRAE 90.1.

4. Fire Hazard Classification:
   a. Flame Spread: 25.
   b. Fuel Contributed: 50.
   c. Smoke Developed: 50.

5. Density: Three pounds per cubic foot (pcf) minimum.

6. Fittings: Molded fiberglass.

7. Jointing Materials: Manufacturer's recommended adhesives and tape.

8. Valve Insulation: Miter cut nesting size covering segments of same thickness as pipeline, for insulation of valves.

B. PVC Pipe Jacketing,Valve and Fitting Covers:

1. Manufacturers: Provide products of one of the following:
   a. Proto Corporation
   b. Speedline Corporation.
   c. Zeston by Johns Manville.
   d. Or equal.

2. Type: PVC Jacketing (for insulated piping and appurtenances located indoors, unless otherwise shown or indicated):
   a. 25/50 PVC, conforming to ASTM D1784, Class 16354-C and C-585
   b. Thickness: 20 mils.
   c. Color: White.
   d. Finish: Glossy.
   e. Temperature: Suitable for 150 degrees F, minimum.
   f. Provide insulation adhesive of other means of sealing jacketing per manufacturer insulation instructions.

C. Handicapped Lavatory Trim Insulation:

1. Products and Manufacturers: Provide one of the following:
   a. Lav Guard 2 by Truebro, Inc.
   b. Pro Wrap, by McGuire Manufacturing Company, Inc.
   c. Or equal.

2. Type: Flexible vinyl insulation for waste, traps, hot and cold water supplies.

3. References:
   a. ADA Article 4.19.4.
   b. ANSI A117.1.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials are to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Piping systems to be insulated and associated insulation thicknesses are specified in the schedule at the end of this Section.

2. Thoroughly clean all piping, insulation, and accessories prior to installation.

3. Remove from piping all dirt, rust, dust, and other materials detrimental to proper installation of insulation.

4. Install items as shown, specified, and as recommended by manufacturer.

5. Request interpretation from ENGINEER if there is conflict between manufacturer's recommendations and the Contract Documents.

6. Do not modify structures to facilitate installation of piping insulation unless approved by ENGINEER.

7. Installation of plumbing piping insulation shall conform to Laws and Regulations.

8. Surfaces of piping, valves, and fittings shall be clean and dry before applying insulation.

9. Install piping insulation after associated piping system has been successfully tested.

10. Provide high-density insulation pipe support inserts at each hanger and shield extending halfway up the pipe insulation cover and extending along pipe at least six inches on each side of hanger. Securely fasten shield with pipe straps at each end. Insulate pipe anchors adequately to prevent moisture condensation problems.

11. Cover insulated surfaces of outdoor piping with stainless steel jacketing neatly fitted and firmly secured. Lap the seams at least two inches. Apply over vapor barrier, where applicable.

12. Protection: Piping insulation materials applied each day shall have vapor barrier applied the same day and exposed ends shall be temporarily protected with moisture barrier and sealed to pipe.

3.3 ADJUSTING

A. Adjusting:

1. Adjust or replace, as required, poorly-fitted joints.

3.4 SCHEDULES

A. Piping Insulation Schedule: Insulate plumbing piping as specified below, unless otherwise specified or shown:

1. All hot, cold and recirculation piping 2.5-inch diameter and smaller: Insulation thickness shall be one-inch minimum.

2. All hot, cold and recirculation piping three-inch diameter and larger: Insulation thickness shall be 1.5-inch minimum.

3. Insulate plumbing piping below handicapped lavatories. Thickness to be manufacturer's standard thickness as specified in Part 2 of this Section.

END OF SECTION

SECTION 22 10 53

INSTALLATION OF PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install plumbing piping systems complete with accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the installation of plumbing piping Work.

2. Notify other contractors in advance of the installation of the installation of plumbing piping to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the installation of plumbing piping Work.

C. Related Sections:

1. Section 09 90 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American National Standards Institute, (ANSI).
   a. ANSI B13.1, Code for Pressure Piping.
   b. ANSI B31.1, Power Piping.

2. American Society for Testing and Materials, (ASTM).

3. American Welding Society, (AWS).
   a. AWS D10.9, Welding Procedures and Welders for Piping and Tubing.

4. Institute of Electrical and Electronic Engineers, (IEEE).

5. National Electrical Code, (NEC).

6. National Electrical Manufacturers' Association, (NEMA).

7. National Fire Protection Association, (NFPA).

8. Underwriters' Laboratories, Incorporated, (UL).

1.3 QUALITY ASSURANCE

A. Installer’s Qualifications:

1. Engage a single installer regularly engaged in plumbing piping installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to ENGINEER.

2. Engage a single installer for the entire plumbing piping system with undivided responsibility for performance and other requirements.

B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Local and State Building Codes and Ordinances.

2. Permits: CONTRACTOR shall obtain and pay for all required permits, fees and inspections.

C. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single installation of plumbing piping manufacturer.

2. The installation of plumbing piping manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the installation of plumbing piping manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. 1/4-inch scale piping layouts, dimensioned to show length of piping runs, pipe sizes, support spacing and expansion provisions.
   b. Details of installation, including piping supports.

c. Submit pipe schedule with laminate construction, sizes, thickness, vacuum pressure, weight per foot pressure, spans, joint type and flange data.

2. Product Data:
   a. Manufacturer's literature, illustrations, specifications and engineering data.
   b. Flexible connections.
   c. Other technical data related to the specified material and equipment as requested by ENGINEER.
   d. Gasket material.

B. Informational Submittals: Submit the following:

1. Qualifications Statements:
   a. Installer’s qualifications.

C. Closeout Submittals: Submit the following:

1. Record Drawings:
   a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of the piping Work submit CADD drawings showing the actual in-place installation of all piping and equipment installed under this Section at a scale satisfactory to the OWNER. The Record Drawings shall show all piping on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the piping systems. Two paper prints shall also be furnished. The prints and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 GENERAL REQUIREMENTS

A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.

B. The Drawings show an indication of the arrangement of equipment, piping, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. The piping, equipment, ducts, etc. found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged as to fully and best suit the requirements of each particular case, adequately provide for expansion and perfect circulation and minimize the amount of space required for the same.

D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, CONTRACTOR, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by ENGINEER.

E. The Drawings do not show all offsets, fittings, accessories and details, which may be required. CONTRACTOR shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others," to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials for piping system shall be specified under applicable Sections of Division 40, Process Integration.

2.2 PAINTING

A. All equipment and accessories shall be painted in accordance with the requirements of Section 09 90 00, Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install all items as shown, specified, and as recommended by the manufacturer.

2. Request instructions from ENGINEER, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.

3. Present conflicts to ENGINEER, in writing, who will determine corrective measures to be taken.

4. Do not modify structures to facilitate installation of piping, unless specifically approved by ENGINEER.

5. Installation to conform to requirements of all local and state codes.

6. Properly plug or cap the open ends of all piping at the end of each day's Work or other stopping point through construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Fill all systems and fully test all equipment, valves, piping, etc. in operation.

2. Check for excessive vibration while all systems are operating.

3. Installed systems and components will not be released to OWNER unless all systems have been tested and approved by the ENGINEER.

B. Inspection:

1. Examine areas to receive piping, valves and accessories for:
   a. Defects that adversely affect execution and quality of the Work.
   b. Deviations beyond allowable tolerances for piping, valves and accessories.
   c. Start the Work only when conditions are satisfactory.

2. The ENGINEER reserves the right to reject or authorize replacement of piping and accessories found to be defective.

3.3 ADJUSTING AND CLEANING

A. Adjusting:

1. While system is operable, balance all equipment, valves, etc. to achieve design conditions.

B. Cleaning:

1. Thoroughly clean all piping, fittings, valves, and accessories prior to installation.

2. Remove all dirt, rust, dust, etc. from piping in preparation for painting.

3. Remove and dispose of all debris and waste from the Site resulting from installation.

END OF SECTION

SECTION 22 10 63

TESTING OF PLUMBING PIPING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified, and required to complete all testing of the plumbing piping systems.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the testing of plumbing piping systems Work.

2. Notify other contractors in advance of the installation of the testing of plumbing piping systems to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the testing of plumbing piping systems Work.

C. Related Sections:

1. Section 09 90 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American National Standards Institute, (ANSI).

2. American Society for Testing and Materials, (ASTM).

3. Institute of Electrical and Electronics Engineers, (IEEE).

4. National Electrical Manufacturers' Association, (NEMA).

5. National Fire Protection Association, (NFPA).
   a. NFPA 99, Standard for Health Care Facilities.

6. Underwriters' Laboratories, Incorporated, (UL).

1.3 QUALITY ASSURANCE

A. Installer's Qualifications:

1. Contractor regularly engaged in testing of plumbing piping systems and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to ENGINEER.

B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Local and State Building Codes and Ordinances.

2. Permits: CONTRACTOR shall obtain and pay for all required permits, fees and inspections.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:
   a. Submit manufacturer's literature and samples for the valve tags.

2. Testing Plans, Procedures, and Testing Limitations:
   a. Description of proposed testing method, procedures, and apparatus to the ENGINEER for approval at least 48 hours in advance of testing.

B. Informational Submittals: Submit the following:

1. Site Quality Control Submittals:
   a. Submit a test report for each test to the ENGINEER certifying the test pressure, duration of test, and test performance of all installed piping.

2. Qualifications Statements:
   a. Installer's qualifications.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide all necessary equipment and materials, including gages and pumps, to perform the testing operations.

PART 3 - EXECUTION

3.1 GENERAL

A. Conduct water, air and smoke tests as required, on all piping systems as specified below.

B. Conduct all tests in the presence of, and in a manner approved by ENGINEER, all state and local authorities having jurisdiction. Repeat test for these authorities if requested by them.

C. Repair and retest all lines, which do not pass the tests as specified herein.

D. Inspect all valves, joints, and specialties for tightness and for proper operation while under test pressure.

E. Properly plug or cap the open ends of all piping at the end of each day's Work or other stopping point through the testing. Piping shall be tightly covered and protected against contamination.

3.2 FIELD QUALITY CONTROL

A. Water Tests:

1. Drainage and Vent system piping:
    a. Perform tests either on the entire system or on successive sections of the system.
    b. Tightly close all openings, except the highest opening of the system or section to be tested.
    c. Fill the system or section with water to the point of overflow.
    d. Test with a head of at least ten feet of water, except for the uppermost ten feet of the system.
    e. Allow water to stand in the system for at least 15 minutes before inspecting.
    f. Inspect the system or section for leaks, and repair any leaks found.

2. Water Piping:
    a. Water piping shall be tested and proved tight under a pressure not less than 1-1/2 times the working pressure under which it is to be used, but not less than 100 psig for 30 minutes with no loss of pressure.
    b. Potable water shall be used for testing potable water systems. Non-potable water shall be used for testing non-potable water systems.

B. Air Tests:

1. Attach air compressor testing apparatus to any suitable opening after closing all other inlets and outlets. Force dehydrated oil-less compressed air, pressure dew point -40ºF, into system until there is a uniform gage pressure without the introduction of additional air. Below is a list of required gage pressures:
   a. Drainage and Vent Piping (substitute for water test): Five psi for 15 minutes.

C. Smoke Tests:

1. Finished Plumbing: Final test for water tightness of the completed drainage and vent system:
   a. Fill all traps with water.
   b. Introduce a pungent thick smoke, produced by one or more smoke machines, into the system.
   c. When the smoke appears at stack openings on the roof, close the system.
   d. Maintain a pressure in the system equivalent to a 1-inch water column for the period of the inspection.
   e. Inspect the system for leaks and repair any leaks found.

END OF SECTION

SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install domestic water piping systems complete with accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the domestic water piping systems Work.

2. Notify other contractors in advance of the installation of the domestic water piping systems to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the domestic water piping systems Work.

C. Related Sections:

1. Section 09 90 00, Painting.

2. Section 22 05 27, Pipe Sleeves for Plumbing

3. Section 22 05 29, Hangers and Supports for Plumbing Piping

4. Section 22 05 53, Identification of Plumbing Piping and Equipment.

5. Section 22 05 93, Disinfection of Plumbing Piping

6. Section 22 07 19, Plumbing Piping Insulation

7. Section 22 10 53, Installation of Plumbing Piping

8. Section 22 10 63, Testing of Plumbing Piping

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. ADA Accessibility Guidelines (ADAAG)

2. ANSI A13.1, Scheme for Identification of Piping Systems.

3. ANSI A21.1, Practice Manual, Computation Strength, Thickness.

4. ANSI A21.10, Cast-Iron and Ductile Iron Fittings, 2-inches through 48-inches, for Water (AWWA C110).

5. ANSI A21.51, Ductile-Iron Pipe Centrifugally Cast, in Metal Molds (AWWA C151).

6. ANSI A112.1.2, Air Gaps in Plumbing System.

7. ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 150 and 800.

8. ANSI B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.

9. ANSI B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings (ASME B16.22).

10. ANSI B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, 150 and 300 lbs (ASME B16.24).

11. ANSI B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.

12. ANSI B16.39, Malleable Iron Threaded Pipe Unions.

13. ANSI B16.42, Ductile Iron Pipe Flanges and Flanged Fittings.

14. ANSI B40.1, Gages - Pressure Indicating Dial - Elastic Element.

15. ANSI H 23.1, Seamless Copper Water Tube, (ASTM B 88).

16. American Society of Sanitary Engineers (ASSE), ASSE 1001, Performance Requirements for Atmospheric Type Vacuum Breakers.

17. ASSE 1018, Trap Seal Primer Valves – Water Supply Fed.

18. ASTM A 126, Specification for Gray Iron Casting for Valves, Flanges and Pipe Fittings.

19. ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

20. ASTM B 32, Specification for Solder Metal.

21. ASTM B 62, Specification for Composition Bronze or Ounce Metal Castings.

22. ASTM B 88, Specification for Seamless Copper Water Tube.

23. ASTM D 1330, Specification for Rubber-Sheet Gaskets.

24. FS O-F-506, Flux, Soldering: Paste and Liquid.

25. FS WW-U-516, Unions, Brass or Bronze, Threaded Pipe Connections and Solder-Joint Tube Connections.

26. Plumbing and Drainage Institute (PDI), PDI WH 201, Water Hammer Arresters.

27. NSF 61: Drinking Water System Components – Health Effects

28. NSF 372: Drinking Water System Components – Lead Content

29. The United States Safe Drinking Water Act

1.3 QUALITY ASSURANCE

A. Installer's Qualifications:

1. Engage a single installer regularly engaged in domestic water piping installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to ENGINEER.

2. Engage a single installer for the entire domestic water piping system with undivided responsibility for performance and other requirements.

B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Local and State Building Codes and Ordinances.

C. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single domestic water piping systems manufacturer.

2. The domestic water piping systems manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the domestic water piping systems manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. 1/4-inch scale piping layouts, dimensioned to show length of piping runs, pipe sizes, support spacing and expansion provisions.
   b. Details of installation, including piping supports.
   c. Submit pipe schedule with laminate construction, sizes, thickness, vacuum pressure, weight per foot pressure, spans, joint type and flange data.

2. Product Data:
   a. Manufacturer's literature, illustrations, specifications and engineering data.
   b. Flexible connections.
   c. Other technical data related to the specified material and equipment as requested by ENGINEER.
   d. Gasket material.

B. Informational Submittals: Submit the following:

1. Qualifications Statements:
   a. Installer’s qualifications.

C. Project Closeout Submittals: Submit the following:

1. Record Documentation:
   a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of piping Work, submit CADD drawings showing the actual in place installation of all piping and equipment installed under this Section at a scale satisfactory to the OWNER. The drawings shall reflect all of the piping Work on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the piping systems. Two paper prints shall also be furnished. The prints and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 GENERAL REQUIREMENTS

A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.

B. The Drawings show an indication of the arrangement of equipment, ducts, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. Piping, equipment, ducts, etc. found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions, without additional cost to the OWNER.

C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case, adequately provide for expansion and perfect circulation and minimize the amount of space required for the same.

D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, CONTRACTOR, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the ENGINEER.

E. The Drawings do not show, all offsets, fittings, accessories and details, which may be required. CONTRACTOR shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. General Requirements:

1. All piping, couplings and fittings to be used in the potable domestic water distribution system shall be certified NSF 61 Annex G/NSF 372 lead-free.

2. All piping and fittings to be used for domestic water shall comply with the current requirements of the United States Safe Drinking Water Act.

B. Copper Water Tube:

1. Tube:
   a. Reference: ANSI H23.1, ASTM B 88.
   b. Type: K or L.
   c. Temper: Hard-drawn or soft-annealed.

2. Fittings:
   a. Reference: ANSI B16.22.
   b. Reference: ANSI B16.26.
   c. Reference: ANSI B16.18.

3. Joints:
   a. Sweat:
      1) Solder Metal: ASTM B 32, Type 95-5TA.
      2) Flux: FS O-F-506, Type 1.
   b. Flanged:
      1) Flanges: ANSI B16.24, 150 lb. class.
      2) Gaskets: Red rubber, ASTM D 1330, Grade 1, 1/8-inch thick.
      3) Nuts and Bolts: ASTM A 307.

4. Unions:
    a. Reference: FS WW-U-516.
    b. Material: Bronze.
    c. Rating: 250 lb. W.O.G.

C. Dielectric Couplings:

1. Manufacturers: Provide products of one of the following:
    a. Hart Industrial Unions, LLC
    b. SSP Corporation
    c. Watts
    d. Mueller Industries.
    e. Or equal.

2. Type: Union or flange.

3. Ratings:
    a. Unions: 250 psi, ANSI B16.39.
    b. Flanges: 175 psi, ANSI B16.42 (Iron), ANSI B16.24 (Bronze).

4. Reference: NSF/ANSI 61-G.

2.2 VALVES

A. General Valves Requirements:

1. All valves and appurtenances to be used in the potable domestic water distribution system shall be certified NSF 61 Annex G/NSF 372 lead-free. Where specified products are third-party certified lead-free, uncertified products shall not be acceptable equals for substitution.

2. All valves, and appurtenances to be used for domestic water shall comply with the current requirements of the United States Safe Drinking Water Act.

B. Bronze Body Globe Valves:

1. Products and Manufacturers: Provide one of the following:
    a. Apollo Valves, 120S-LF Series
    b. Milwaukee Valve, Fig. No. UP1502
    c. Or equal.

2. Type: Composition disc, screwed bonnet.

3. Materials: Lead-free Brass and bronze.

4. Rating: 150 lb. SWP.

5. End Connections: Solder joint.

C. Bronze Body Check Valves:

1. Products and Manufacturers: Provide one of the following:
   a. Apollo Valves., 161S-LF Series
   b. Milwaukee Valve, Fig. No. UP1502
   c. Or equal.

2. Type: Swing, bronze disc, screw-in cap.

3. Materials: Lead-free Brass and bronze.

4. Rating: 200 PSI CWP

5. End Connections: Solder joint.

D. Bronze Body Ball Valves:

1. Products and Manufacturers: Provide one of the following:
   a. Apollo Valves, 77FLF-200 Series
   b. Milwaukee Valve, Fig. No. UPBA150S
   c. Or equal.

2. Type: Non-blowout stem, two-piece, quarter turn, full port ball valve.

3. Materials:
   a. Body: Lead-free bronze or brass.
   b. Ball: Chrome plated brass.
   c. Packing and Seats: Teflon.

4. Rating: 200 PSI CWP.

5. End Connections: Soldered End.

E. Thermostatic Mixing Valve (TMV-1):

1. Manufacturers: Provide products of one of the following:
   a. Powers, Series LFLM490.
   b. Wilkins, Model No. ZW1017XL.
   c. Or equal.

2. Type: Thermostatically operated water-blending device.

3. Materials:
   a. Body: Brass.
   b. Vanes: Brass.

4. Thermostatic element to be located in main body of valve.

5. Minimum Flow: 0.5 gpm.

6. Low outlet temperature type valve shall be adjustable from 60 to 110°F.

7. Test Pressure: 300 psi.

8. Reference: NSF/ANSI 61-G.

F. Point-of-Use Thermostatic Anti-Scalding Valve:

1. Products and Manufacturers: Provide products of one of the following:
   a. Watts, Series LFMMV
   b. Zurn, ZW-1070XL
   c. Or equal

2. Type: Thermostatically operated point-of-use anti-scalding with integral supply checks.

3. End Connection: Soldered-end.

4. Maximum Supply Pressure: 150 PSI

5. Maximum Supply Temperature: 180º F

6. Approvals: ASSE 1070, NSF 61/372

2.3 EQUIPMENT

A. Hose Bibbs (HB-1):

1. Products and Manufacturers: Provide one of the following:
   a. Zurn Z1341-BFP
   b. Acorn Engineering, 8120-LF
   c. Or equal.

2. Valve:
   a. Type: Indoor.
   b. Materials: Bronze body, screwed bonnet, renewable composition disc.
   c. End Connections: Hose thread outlet, NPT thread inlet.
   d. Finish: Chrome Plated.
   e. Rating: 125 lbs. WOG.

3. Vacuum Breaker:
   a. Type: Non-removable, atmospheric.
   b. Materials: Brass body, stainless steel trim, silicone rubber diaphragm and disc.
   c. End Connections: Hose thread inlet and outlet.

4. Vandal Resistant.

5. Reference: NSF 61/NSF 372, ASSE 1011

B. Freeze Proof Wall Hydrants (NFWH-1):

1. Exposed Hose Connection, Non-Freeze Type:
   a. Products and Manufacturers: Provide one of the following:
      1) Jay R. Smith, Fig 5609 SE.
      2) Zurn Industries, Fig. No. Z1321XL
      3) Or equal.
   b. Type: Anti-siphon, non-freeze wall hydrant.
   c. Materials:
      1) Casing: Bronze.
      2) Vacuum Breaker: Integral.
      3) Threads: Standard 3/4-inch hose thread outlet.
      4) Wall Clamp: Adjustable with set screw.
      5) Key: Removable tee handle type.
   d. Connections: 3/4-inch sweat end inlet and 3/4-inch hose thread outlet, universal type.

2. Reference: NSF 61/NSF 372.

C. Cold Water Pressure Washer (PW-1)

1. Enclosed Pressure Washer
   a. Products and Manufacturers: Provide one of the following:
      1) MI-T-M Corporation, Model CAWS-2004-OME3
      2) Alkota Cleaning Systems, Model 518B
      3) Or Equal.
   b. Type: All Electric Pressure Washer.
      1) Motor: 6 HP, 460V, 3 Phase
      2) Flow: 3.9 GPM
      3) Pressure: 2000 PSI
   c. Type: Wall Mounted
   d. Accessories:
      1) Wall mounted Remote Box. Refer to drawings for exact location.
      2) Auto start/stop to control the unit turning on and off.
      3) Trigger Controlled Wand
      4) 3/8” Heavy Duty Double Braided 6000 PSI Pressure Hose

D. Water Hammer Arresters:

1. Products and Manufacturers: Provide one of the following:
   a. Zurn-Wilkins Division of Zurn Industries, 1260XL Series
   b. Watts, LF15 Series
   c. Or equal.

2. Materials:
   a. Casing: Copper Tube
   b. Piston: Polycarbonate
   c. Tailpiece: Low-lead brass

3. Connection: Male NPT thread.

4. Maximum Working Pressure: 250 PSIG.

5. Sizing and Certification: PDI WH 201.

6. References: ASSE 1010, NSF 61 / NSF372

E. Pipe Labels:

1. Type: Self-adhering, temperature resistant, waterproof, corrosion resistant.

2. Marker size, marker color, legend size, and legend color shall conform to ANSI A13.1.

F. Automatic Air Vents:

1. Manufacturers: Provide products of one of the following:
   a. Armstrong Fluid Technologies.
   b. Bell and Gossett.
   c. Or equal.

2. Type: Automatic vent air eliminator with built-in air chamber.

3. Construction:
   a. Body: Bronze.
   b. Finish: Chrome plated exterior.
   c. Overflow Connector: Provide connection for 1/4-inch OD copper tubing.

4. Ratings: 75 psig working pressure.

5. References: NSF 61/NSF 372

G. Thermometers:

1. Manufacturers: Provide products of one of the following:
   a. H.O. Trerice Company.
   b. Weksler Instruments Division of Ashcroft, Inc.
   c. Or equal.

2. Range: 30°F to 240°F temperature range in maximum of 2°F increments.

3. Type: Adjustable Angle Column Type Thermometer.
   a. Construction:
      1) Scales and Lens: Nine-inch high satin finish aluminum scales, black numerals, front reading tubes for non-mercury fluid.
      2) Wells: Insertion well with brass separable sockets.

3) Neck: 2-1/2-inch extension neck.
4) Case: Cast aluminum.
5) Window: Glass or clear acrylic plastic.

H. Pressure Gages:

1. Manufacturers: Provide products of one of the following:
   a. H.O. Trerice Company.
   b. Weksler Instruments Division of Ashcroft, Inc.
   c. Or equal.

2. Reference ANSI B40.1 for Grade AA gages.

3. Type: Direct mounted, dial type pressure gage.

4. Construction:
   a. Case: Six-inch diameter cast aluminum, flangeless with black finish and bottom 1/4-inch N.P.T.
   b. Ring: Chrome plated close type.
   c. Dial: White face, black numbers and graduations.
   d. Window: Glass or clear acrylic plastic.
   e. Pointer: Micrometer type, black finish, red tip.
   f. Movement: Stainless steel, rotary type, delrin sector and bushings.
   g. Bourdon Tube: Type 316 stainless steel
   h. Socket and Tip: Forged brass, alloy steel and Type 316 stainless steel.

5. Accuracy: One percent minimum.

6. Gage Cocks: Provide brass tee handle isolation cock before each gage.

7. All gauges are to be filled with non-mercury organic fluids.

I. Backflow Preventers: 2-1/2-Inches and Larger: (BFP-RPZ-1):

1. Products and Manufacturers: Provide one of the following:
   a. Zurn-Wilkins Division of Zurn Industries, Series 375
   b. Watts, Series 957
   c. Or equal.

2. Type: Reduced pressure zone device with two independently acting check valves, together with an automatically operated pressure differential relief valve located between the two check valves.

3. Materials:
   a. Body: Ductile Iron
   b. Valve Discs: Buna-N rubber.
   c. Diaphragm: Silicon rubber or Buna-N rubber.

4. Maximum Working Pressure: 175 psi.

5. End Connections: Screwed or flanged.

6. Accessories:
   a. Air gap drain funnel with threaded outlet and vent below furnished by manufacturer.
   b. Strainer with blow-off on inlet.
   c. Outside screw and yoke gate valves on inlet and outlet.
   d. Reduced pressure principle backflow preventer test kit for each unit furnished with carrying case, provided in molded plastic carrying case with foam inserts.

7. References: ASSE 1013, AWWA C511, NSF 61/NSF 372 and authority having jurisdiction at the Site

8. Water Meters 2 inches to 8 inches:
   a. Products and Manufacturers: Provide one of the following:
      1) Neptune Water Meter Company, Series HTP
      2) Sensus OMNI T2 Series
      3) Or equal
   b. Type: Turbine Type
   c. Materials:
      1) Body: Lead-free alloy
      2) Register: Lead-free alloy
      3) Gear Train: Direct Coupled
   d. Size: 2-1/2 inch
   e. Maximum Working Pressure: 150 PSI
   f. End Connection: Flanged.
   g. Approvals: NSF 61/NSF372, Local Water Utility

J. Vacuum Breakers:

1. Atmospheric Type: AVB:
   a. Products and Manufacturers: Provide one of the following:
      1) Apollo Valves, Series38LF-100
      2) Watts, Series LF288A.
      3) Or equal.
   b. Type: An assembly containing an air inlet valve, a check seat and an air inlet port to prevent reverse flow of water and allow air into the water line to break a siphon.
   c. Materials:
      1) Hood: Polished Chrome Finish
      2) Body: Lead-Free Bronze.
      3) Vent Disc: Silicone.
      4) Disc Holder Float: Polyethylene.
      5) Body: Lead-Free Bronze.
   d. Reference: ASSE 1001.
   e. Working Pressure: 210°F at 125°F.
   f. Installation: Vertical, minimum 6-inches above fixture vacuum breaker serves.

K. Emergency Eyewash and Shower (Corrosion Resistant, PVC): EES-1:
    a. Products and Manufacturers: Provide one of the following:
        1) Haws Drinking Faucet Company, Model No. 8336.
        2) Speakman Company, Model SE-690-PVC.
        3) Or equal.
    b. Type: Free standing, corrosion resistant, emergency eyewash and shower combination station with hand and foot operation.
    c. Materials:
        1) Shower: 9-inch diameter ABS or cycolac plastic showerhead with 1-1/2-inch stay-open stainless steel ball valve and 24-inch rigid pull rod.
        2) Eye/Face-Wash: ABS or cycolac bowl with twin Buna-N covered ABS heads and stainless steel ball valve, stay open type.
        3) Pipe: All PVC parts shall be Schedule 80, epoxy coated.
        4) Supply: 1-1/4-inch IPS.
        5) Accessories: Foot control assembly.
    d. Tempering Valve: Provide emergency fixture tempering valve as specified below to produce 85°F water at minimum 33 gpm flow rate.
    e. References: ANSI Z358.1

2. Flow Switches, Audible and Visible Alarms:
    a. Manufacturers: Provide products of one of the following:
        1) Haws Drinking Faucet Co.
        2) Speakman Company.
        3) Or equal.
    b. Type: 1 pole, double throw, NEMA 1, UL listed paddle type flow switch. Contacts to be rated for five amps at 120 VAC.
    c. Flow switches shall be furnished by the emergency eyewash and shower station's manufacturer to ensure compatibility and proper sensing of flows from eyewash, shower or combination of the two flows. CONTRACTOR shall assume complete responsibility for the proper operation of the flow sensing of the eyewash and shower units if flow switches other than furnished or recommended by the emergency shower and eyewash stations manufacturer are used.
    d. Flow switches on combination emergency eyewash & shower stations shall sense flow for either shower or eyewash or combination of the two flows. Flow switches shall be full line size so as not restrict water flow in order to detect flow. Each individual emergency shower, eye/face wash, and combination station shall be equipped with a flow switch.
    e. Visible alarm shall be an amber flashing light, UL listed.
    f. Audible alarm shall be an intermittent signal rated at 85 dB at ten feet.
    g. Each shower shall be furnished with a shower and eyewash test kit.
    h. Coordinate electrical wiring and connection of flow switches and audible and visible alarms with Division 26, Electrical.

3. Safety Valve Lockout with Padlock:
    a. Heavy-duty plastic, dielectric and chemical resistant valve lock.
    b. Padlock with unique serial number, hardened steel shackle, and two brass keys with matching serial numbers for each padlock.
    c. Manufacturers: Provide products of one of the following:
        1) Akron, Safety Products, Inc.
        2) Brady USA, Inc.
        3) Or equal.

4. Emergency fixture Tepid Water Mixing Valve (TWMV-1):
    a. Manufacturers: Provide products of one of the following:
        1) The Bradley Corporation, 'Navigator' EFX Series
        2) Leonard Water Temperature Controls, ECO-Mix Series
        3) Or equal.
    b. Type: Thermostatically operated water temperature control device.
    c. Materials:
        1) Body: Lead-Free Brass.
        2) Vanes: Lead-Free Brass.
        3) Cabinet: Stainless steel.
    d. Thermostatic element to be located in main body of valve.
    e. Outlet dial thermometer.
    f. Locking temperature regulator set at 85ºF.
    g. Internal cold water bypass and temperature override protection.
    h. Maximum Supply Pressure: 125 psi.
    i. Maximum Supply Temperature: 180ºF.
    j. Reference: ANSI Z358-1, NSF 61/372.

L. Aquastats:

1. Manufacturers: Provide products of one of the following:
    a. Honeywell.
    b. Johnson Controls.
    c. Or equal.

2. Type: Immersion type for regulating water temperature in hot water piping, tepid water piping, or hot water storage tanks.

3. Electrical Rating: 120 VAC.

4. Set point Range:
    a. Domestic Hot Water: Make contacts on temperature drop below 112°F; break contacts on temperature rise above 120°F.
    b. Tepid Water: Make contacts on temperature drop below 70°F; break contacts on temperature rise above 90°F.

5. Adjustment: Adjustable setpoint through knob on cover.

6. Differential: Adjustable 3°F to 10°F.

7. Accessories: Provide immersion well.

M. Floor Mounted Hose Reel (HR-1):

1. Products and Manufacturers: Provide one of the following:
   a. Hannay Reels, Model E-1514-17-18.
   b. Cox Reels, 1125-4-100 EA
   c. Reelcraft
   d. Or equal.

2. Type: Motorized Floor Mounted Hose Reel with direct gear drive on motor.

3. Material: All welded steel “A” frame construction.

4. Requirements:
   a. Hose: 100’
   b. Electrical Requirements:
      1) Motor: 115V AC 1/3 HP Face Mount - AN-351
   c. Provide reducer where required to reduce connection from ½” to 3/8”. Reducer to be rated for 2000 PSI

N. Hose Nozzles:

1. Products and Manufacturers: Provide one of the following:
   a. MT-T-M Model 850-0175
   b. Or equal.

2. Nozzle: Adjustable fog nozzle, capable of complete shut-off, solid straight stream, or any degree of solid conical fog.

O. Hose:

1. Products and Manufacturers: Provide one of the following:
   a. MI-T-M Model 15-0723
   b. Or equal.

2. Type: Double braided synthetic hose for use with continuous flow reels to permit flow while hose is coiled on reel.

P. Wall Mounted Hose Reels (HR-2):

1. Products and Manufacturers: Provide one of the following:
   a. Cox Reels, model #117-5-100-RH with inlet hose assembly model #15717
   b. Reel Craft, model #CA33112 L with inlet hose assembly model # S601034-5
   c. Or equal.

2. Type: Swivel Hand Crank Reel.

3. Material: All Welded Steel “A” Frame.

4. Maximum Operating Pressure: 1000 PSI.

5. Hose Length: 100’

6. Provide reducer where required to reduce connection from ½” to 3/8”. Reducer to be rated for 2000 PSI

Q. Hose Nozzles:

1. Products and Manufacturers: Provide one of the following:
   a. Columbia Products, model #N1TB.
   b. Or equal.

2. Material: Brass.

3. Maximum Working Pressure: 150 PSI

4. Nozzle: Adjustable nozzle, with removable ¾” GHT threaded tip for attaching accessories.

5. Complete with shutoff trigger when released.

R. Hose:

1. Products and Manufacturers: Provide one of the following:
   a. Cox Reels, Model RH
   b. Reel Craft, Model S601026-100
   c. Or equal.

2. Type: Synthetic Rubber Hose

3. Hose Length: 100’

S. Trap Primer Valve (TPV-1):

1. Manufacturers: Provide products of one of the following:
   a. MIFAB series M-500
   b. Watts series LFTP300.
   c. Or equal.

2. Construction:
   a. Body: Brass.
   b. Seals: O-ring 40°F to 450°F.
   c. Inlet and Outlet Size: 1/2-inch.
   d. Integral backflow preventer.
   e. Provide multiple outlet distribution units, as required.
   f. Reference: ASSE 1018, NSF 61/NSF 372
   g. Accessories: Floor drain trap primer distribution unit.

T. Hot Water Temperature Maintenance Heat Tracing:

1. Manufacturers: Provide products of one of the following:
   a. Raychem Products Division
   b. Thermon Manufacturing Company.
   c. Or equal.

2. General: Furnish and install a complete UL listed system of heat trace cable(s) and components approved and designed specifically for maintaining various hot water temperatures ranging from 110ºF to 140ºF. Hot water from hot water heater(s) to plumbing fixtures and as shown, shall be electrically traced with self-limiting heaters. Manufacturer shall assist in selecting the correct tracer and develop Bill of Materials. All connections and equipment shall be moisture-proof.

3. The heater cable assembly shall consist of two No. 14 AWG parallel nickel-plated copper bus wires imbedded in a self-regulating core and covered in a cross-linked polyolefin insulating jacket. The heater assembly shall be covered with tinned copper metallic braid and an outer jacket of cross-linked polyolefin insulation, nominally of 40-mil thickness, and color-coded for easy identification.

4. The cable shall be rated for 120 or 208 Volt operation.

5. Pipe and heat trace shall be insulated with 1-1/2-inch thick fiberglass insulation as described in Section 22 07 19, Plumbing Piping Insulation.

6. Provide all splice power-to-tracing connectors, thermostats, end terminations, straps, ground fault circuit breakers, junction boxes, etc., as required.

U. Tepid Water Temperature Maintenance Heat Tracing:

1. Manufacturers: Provide products of one of the following:
   a. Raychem Products Division
   b. Thermon Manufacturing Company.
   c. Or equal.

2. General: Furnish and install a complete UL listed system of heat trace cable(s) and components approved and designed specifically for maintaining a minimum tepid water temperature of 85ºF for emergency eyewash and shower equipment. All piping systems as specified below shall be electrically traced with self-limiting heaters. Adjustable control thermostats, to maintain a constant water temperature for the water heat tracing system shall be provided as recommended by manufacturer.
   a. Tepid Water Piping: All exposed potable water piping serving emergency showers and eyewash stations shall be maintained to a temperature of 85ºF.

Manufacturer shall assist in selecting the correct tracer and developing a recommended Bill of Materials. All components of the systems shall be product of manufacturer. All connections and equipment shall be moisture-proof.

3. The heater cable assembly shall consist of two No. 14 AWG parallel nickel-plated copper bus wires imbedded in a self-regulating core and covered in a cross-linked polyolefin insulating jacket. The heater assembly shall be covered with tinned copper metallic braid and an outer jacket of cross-linked polyolefin insulation, nominally of 40-mil thickness, and color-coded for easy identification.

4. The cable shall be rated for 120 or 208 Volt operation.

5. Pipe and heat trace shall be insulated with 1-1/2-inch thick fiberglass insulation as described in Section 22 07 19, Plumbing Piping Insulation.

6. Provide all splice power-to-tracing connectors, thermostats, end terminations, straps, ground fault circuit breakers, junction boxes, etc., as required.

2.4 PAINTING

A. Piping and accessories shall be painted in accordance with Section 09 90 00, Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install all items as shown, specified, and as recommended by the manufacturers.

2. Request instructions from ENGINEER, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.

3. Present conflicts between piping systems and/or equipment and/or structures to ENGINEER, in writing, who will determine corrective measures to be taken.

4. Do not modify structures to facilitate installation of piping, unless specifically approved by ENGINEER.

5. Installation shall conform to requirements of all local and state codes.

6. Properly plug or cap the open ends of all piping at the end of each day's Work or other stopping point through construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

7. Unless otherwise required by the tubing manufacturer or AHJ, copper tubing, fittings, couplings, and soldered joints shall be installed according to methods and procedures described in "The Copper Tube Handbook" reference publication by the Copper Development Association.

8. All valves and equipment are to be installed perfectly plumb and level, in horizontal runs of piping (except where specifically indicated for vertical piping installation).

9. All required access shall be provided for valves and equipment. Where valves or equipment are installed behind walls, above ceilings, or in otherwise inaccessible locations,

10. All fixtures are to be installed perfectly plumb and level with finished walls and floors and are to be in perfect working condition.

11. All workmanship is to be neat, clean, and free of any visible defect or damage.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Fill all systems and fully test all equipment, valves, dampers, etc. in operation.

2. Check for excessive vibration while all systems are operating.

3. Installed systems and components will not be released to OWNER, unless all systems have been tested and approved by the ENGINEER.

B. Inspection:

1. Examine areas to receive piping, valves and accessories for:
   a. Defects that adversely affect execution and quality of the Work.
   b. Deviations beyond allowable tolerances for piping, valves and accessories.
   c. Start the Work only when conditions are satisfactory.

2. The ENGINEER reserves the right to reject or authorize replacement of piping and accessories found to defective.

3.3 ADJUSTING AND CLEANING

A. Adjusting:

1. Adjust all controls for proper settings.

2. While system is operable balance all equipment, valves, dampers, etc. to achieve design conditions.

B. Cleaning:

1. Thoroughly clean all piping, fittings, valves, and accessories prior to installation.

2. Remove all dirt, rust, dust, etc. from piping in preparation for painting.

3. Remove and dispose of all debris and waste from the Site resulting from installation.

3.4 MATERIAL SCHEDULES

A. Piping:

1. Use types of pipe and fittings as specified below, unless otherwise specified or shown.

2. All potable water supply, hot, cold, tepid piping 2-1/2-inches and smaller, run within the interior of a building, shall be hard-drawn copper Type “L” with solder joints and connections.

3. All potable water piping 2-1/2-inches and smaller run underground shall be soft-annealed copper Type “K” copper tubing.

4. All water piping 3-inches and larger run above ground within the interior of a building, shall be Type “L” hard-drawn copper tubing with soldered joints and fittings.

5. All exposed water piping and valves to plumbing fixtures shall be chrome-plated brass.

6. All valves for copper tubing less than 3 inches diameter shall be bronze bodied, unless otherwise specified.

7. All valves for copper tubing 3-inches diameter and larger shall be iron valves with di-electric flange adaptors.

8. Use “wrought copper” fittings for copper tubing.

END OF SECTION

SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install sanitary waste and vent piping systems complete with accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the domestic water piping systems Work.

2. Notify other contractors in advance of the installation of the domestic water piping systems to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the domestic water piping systems Work.

C. Related Sections:

1. Section 09 90 00, Painting.

2. Section 22 05 27, Pipe Sleeves for Plumbing.

3. Section 22 05 29, Hangers and Supports for Plumbing Piping.

4. Section 22 05 53, Identification of Plumbing Piping and Equipment.

5. Section 22 10 53, Installation of Plumbing Piping.

6. Section 22 10 63, Testing of Plumbing Piping Systems.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American Society of Sanitary Engineering, (ASSE).

2. The American Society of Mechanical Engineers (ASME).
   a. ASME A112.14.1, Backwater Valves
   b. ASME B16.29, Standard for Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings – DWV.

3. American Society for Testing and Materials, (ASTM).
    a. ASTM A 74, Specification for Cast-Iron Soil Pipe and Fittings.
    b. ASTM A 518/A 518M, Specification for Corrosion-Resistant High-Silicon Iron Castings.
    c. ASTM A 861, Specification for High-Silicon Iron Pipe and Fittings.
    d. ASTM A 888, Specification for Hubless Cast-Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
    e. ASTM B 306, Standard Specification for Copper Drainage Tube (DWV)
    f. ASTM C 564, Specification for Rubber Gaskets for Cast-Iron Soil Pipe and Fittings.
    g. ASTM D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
    h. ASTM D 1785, Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.
    i. ASTM D 2665, Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings.
    j. ASTM F441/441M, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
    k. ASTM F 493, Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
    l. ASTM F 656, Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
    m. ASTM F 2618 Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Chemical Waste Drainage Systems.

4. Cast-Iron Soil Pipe Institute, (CISPI).
    a. CISPI 310 Specification for Couplings for Use in Connection with Hubless Cast-Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
    b. CISPI HSN, Specification for Neoprene Rubber Gaskets for Hub and Spigot Cast-Iron Soil Pipe and Fittings.

5. Federal Specifications, (FS).
    a. FS QQ-C-40, Calking Lead Wool and Lead Pig.

6. National Sanitation Foundation (NSF).
    a. NSF 14: Plastic Piping System Components and Related Materials

1.3 QUALITY ASSURANCE

A. Installer's Qualifications:

1. Engage a single installer regularly engaged in sanitary piping installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to ENGINEER.

2. Engage a single installer for the entire sanitary waste and vent piping system with undivided responsibility for performance and other requirements.

B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Local and State Building Codes and Ordinances.

2. Permits: CONTRACTOR shall obtain and pay for all required permits, fees and inspections.

C. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single sanitary waste and vent piping systems manufacturer.

2. The waste and vent piping systems manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the sanitary waste and vent piping systems manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. 1/4-inch scale piping layouts, dimensioned to show length of piping runs, pipe sizes, support spacing and expansion provisions.
   b. Details of installation, including piping supports.
   c. Submit pipe schedule with laminate construction, sizes, thickness, vacuum pressure, weight per foot pressure, spans, joint type and flange data.

2. Product Data:
    a. Manufacturer's literature, illustrations, specifications and engineering data.
    b. Flexible connections.
    c. Other technical data related to the specified material and equipment as requested by ENGINEER.
    d. Gasket material.

B. Informational Submittals: Submit the following:

1. Qualifications Statements:
    a. Installer’s Qualifications

C. Record Documentation: Submit the following:

1. Record Drawings:
    a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of piping Work, submit CADD drawings showing the actual in place installation of all piping and equipment installed under this Section at a scale satisfactory to the OWNER. The drawings shall reflect all of the piping Work on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the piping systems. Two paper prints shall also be furnished. The prints and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

B. Storage of Materials:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer’s recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 GENERAL REQUIREMENTS

A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.

B. The Drawings show an indication of the arrangement of equipment, piping, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. Piping, equipment, etc., found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case and adequately provide for expansion and perfect circulation and minimize the amount of space required for the same.

D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, CONTRACTOR, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the ENGINEER.

E. The Drawings do not show all offsets, fittings, accessories and details, which may be required. CONTRACTOR shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 PIPING

A. Cast-Iron Soil Pipe and Fittings:

1. Pipe and Fittings: ASTM A 74.

2. Weight: Service Weight.

3. Joints:
   a. Compression:
      1) Gasket: Neoprene Rubber, ASTM C 564, CISPI HSN.
      2) Lubricant: As recommended by pipe manufacturer.
   b. Calked:
      1) Lead: FS QQ-C-40, Type I, Grade AA.
      2) Jute Packing: FS HH-P-117, Type I.

B. Hubless Cast-Iron:

1. No-Hub Pipe and Fittings: ASTM A 888.

2. Joints: CISPI 310.

2.2 DRAINS AND CLEANOUTS

A. Drains:

1. Floor Drain and Shower Drain, General Use: (FD-1)
   a. Products and manufacturers: Provide one of the following:
      1) Jay R Smith, Fig. No. 2010-U-PB-P050.
      2) Zurn Industries, Fig. No. ZB-415S-P-VP.
      3) Or equal.
   b. Materials:
      1) Body: Factory coated cast iron.
      2) Collar: Cast-iron, reversible, threaded for strainer heads.
      3) Strainer Head: Square 8-inch by 8-inch polished bronze grate with bronze body, heel-proof grate, and vandal-proof screws.
   c. Outlet Connection: Bottom outlet, calk or no-hub.
   d. ½" Trap Primer Connection Fitting on Drain.

2. Trench Drains (TR-1):
   a. Products and Manufacturers: Provide one of the following:
      1) Zurn ZF-812
      2) JR Smith Zip Trench 9960
      3) Aco Drain Model S300K
      4) Or Equal.

b. Type: Polymer Heavy Duty Pre-sloped trench drain
c. Materials:
    1) Cast-in Ductile Iron grates with Ductile Iron edge rail.
d. Boltless Locking System.
e. Interconnecting end profiles.
f. 4-Bolt Slotted Grate.
g. Channel Internal Width: 12”
h. Universal Closing End Cap

B. Cleanouts:

1. Cleanout Deck Plates (FCO-1) :
    a. Products and Manufacturers: Provide one of the following:
        1) Jay R. Smith, Fig. 4043S.
        2) Zurn Industries, Fig. No. Z-1400-K-BP.
        3) Or equal.
    b. Materials: Cast-iron body and adjustable nickel bronze top.
    c. Outlet Connection: Standard spigot.
    d. Accessories:
        1) Square nickel bronze top.
        2) Cast bronze taper thread plug.

2. Wall Cleanout Plate (WCO-1):
    a. Products and Manufacturers: Provide one of the following:
        1) Jay R. Smith, Fig. 4402-BP.
        2) Josam Company, 58600-C Series.
        3) Or equal.
    b. Materials: Cast bronze taper thread plug.
    c. Accessories:
        1) Stainless steel round shallow wall plate.
        2) Cast-iron calked ferrule.

2.3 PAINTING

A. All piping and accessories shall be painted in accordance with the requirements of Section 09 90 00, Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install all items as shown, specified, and as recommended by the manufacturer.

2. Request instructions from ENGINEER, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.

3. Present conflicts to Engineer, in writing, who will determine corrective measures to be taken.

4. Do not modify structures to facilitate installation of piping, unless specifically approved by ENGINEER.

5. Installation shall conform to requirements of all local and state codes.

6. Installation of piping shall be in accordance with Section 22 10 53, Installation of Plumbing Piping.

7. Installation of hangers and supports shall be in accordance with Section 22 05 29, Hangers and Supports for Plumbing and Piping Equipment.

8. Protection: Properly plug or cap the open ends of all piping at the end of each day's Work or other stopping point through construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Tests: Water or smoke test piping in accordance with Section 22 10 63, Testing of Plumbing Piping Systems.

2. Fill all systems and fully test all equipment, valves, etc. in operation.

3. Check for excessive vibration while all systems are operating.

4. Installed systems and components will not be released to OWNER, unless all systems have been tested and approved by the ENGINEER.

B. Inspection:

1. Examine areas to receive piping, valves and accessories for:
   a. Defects that adversely affect execution and quality of the Work.
   b. Deviations beyond allowable tolerances for piping, valves and accessories.
   c. Start the Work only when conditions are satisfactory.

2. The ENGINEER reserves the right to reject or authorize replacement of piping and accessories found to defective, blistered, cracked or deviated from allowable tolerances as described above.

3.3 ADJUSTING AND CLEANING

A. Adjusting:

1. While system is operable, balance all equipment, valves, etc. to achieve design conditions.

B. Cleaning:

1. Thoroughly clean all piping, fittings, valves, and accessories prior to installation.

2. Remove all dirt, rust, dust, etc. from piping in preparation for painting.

3. Remove and dispose of all debris and waste from the Site resulting from installation.

3.4 MATERIAL SCHEDULES

A. Piping:

1. Use types of pipe and fittings as specified below, unless otherwise specified or shown.

2. All exposed gravity sanitary waste and vent piping 1-1/2-inches and larger run within the interior of a building shall be no-hub cast-iron.

3. All gravity sanitary waste and vent piping 1-1/2-inches and larger located in concrete slabs or underground to exterior limits as shown shall be service-weight cast-iron soil pipe with hub-and-spigot fittings.

END OF SECTION

SECTION 22 13 23

SANITARY WASTE INTERCEPTORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install sanitary waste interceptors complete with accessories.

B. Coordination

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the Sanitary Waste Interceptor.

C. Related Sections:

1. Section 22 05 27, Pipe Sleeves for Plumbing.

2. Section 22 05 53, Identification of Plumbing Piping and Equipment.

3. Section 22 10 53, Installation of Plumbing Piping.

4. Section 22 10 63, Testing of Plumbing Piping.

5. Section 22 13 16, Sanitary Waste and Vent Piping.

1.2 REFRENCES

A. Standards referenced in this section are listed below:

1. American Society of Mechanical Engineers (ASME):
   a. A112.14.3-2018, Hydromechanical Grease Interceptors

2. American Society for Testing and Materials (ASTM):
   a. A48/A48M, Standards specification for Gray Iron Castings
   b. A536, Standard Specification for Ductile Iron Castings

3. International Association of Plumbing and Mechanical Officials (IAMPO) IAPMO PS-80

1.3 QUALITY ASSURANCE

A. Installer's Qualifications:

1. Engage a single installer regularly engaged in sanitary piping installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to ENGINEER.

2. Engage a single installer for the entire sanitary waste and vent piping system with undivided responsibility for performance and other requirements.

B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Local and State Building Codes and Ordinances.

2. Permits: CONTRACTOR shall obtain and pay for all required permits, fees and inspections.

C. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single sanitary waste and vent piping systems manufacturer.

2. The waste and vent piping systems manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the sanitary waste and vent piping systems manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. 1/4-inch scale piping layouts, dimensioned to show length of piping runs, pipe sizes, support spacing and expansion provisions.
   b. Details of installation, including piping supports.
   c. Submit pipe schedule with laminate construction, sizes, thickness, vacuum pressure, weight per foot pressure, spans, joint type and flange data.

2. Product Data:
    a. Manufacturer's literature, illustrations, specifications and engineering data.
    b. Flexible connections.
    c. Other technical data related to the specified material and equipment as requested by ENGINEER.
    d. Gasket material.

B. Informational Submittals: Submit the following:

1. Qualifications Statements:
    a. Installer’s Qualifications

C. Record Documentation: Submit the following:

1. Record Drawings:
    a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of piping Work, submit CADD drawings showing the actual in place installation of all piping and equipment installed under this Section at a scale satisfactory to the OWNER. The drawings shall reflect all of the piping Work on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the piping systems. Two paper prints shall also be furnished. The prints and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

B. Storage of Materials:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer’s recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 GENERAL REQUIREMENTS

A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.

B. The Drawings show an indication of the arrangement of equipment, piping, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. Piping, equipment, etc., found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case and adequately provide for expansion and perfect circulation and minimize the amount of space required for the same.

D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, CONTRACTOR, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the ENGINEER.

E. The Drawings do not show all offsets, fittings, accessories and details, which may be required. CONTRACTOR shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 OIL INTERCEPTOR

A. Cast-Iron or Steel Oil Interceptors:

1. Products and Manufacturers: Refer to grease interceptor schedule on design drawings. Provide one of the following:

a. Zurn Industries Fig Z1198-ST
b. Watts Corporation Model OI-ST
c. Or equal.

2. Description: Acid Resistant interior/exterior fabricated steel oil interceptor with flow control fitting.

3. Standard: IAPMO PS-80, for intercepting and retaining oils from food-preparation .

4. Cover: Secure Gasketed epoxy coated steel skid-proof cover. with removable lift handles

5. Wall mounted oil level float sensor

6. Visible double wall trap seal.

7. Cleanout: Bronze cleanout plug.

8. Body Extension: Required

9. removable combination pressure equalizing/flow diffusing baffle and sediment bucket.

10. Adjustable Oil draw-off, and vent connections.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interceptors shall be set level and plumb.

B. Install interceptor unit, including trapping, venting, and flow-control fittings according to the manufacture's installation instructions and with recommended service clearances.

C. Install interceptor unit with cleanout immediately downstream from unit that do not have integral cleanout on the unit.

D. Interceptor unit covers shall be set flush with finished surface in the floor and the tops shall be traffic-rated.

E. If an installation is unsatisfactory to the ENGINEER, the Contractor shall correct the installation at no cost or time to the OWNER.

3.2 CONNECTIONS

A. Pipe installation requirements are specified in Section 22 13 00, SANITARY AND VENT PIPING.

B. Piping connections shall be made between interceptor oil removal unit and piping systems in accordance with manufacturer's written guidelines.

3.3 WARNING TAPE

A. Warning tape shall be placed over ferrous piping.

B. Detectable warning tape shall be used over nonferrous pipe and over the edges of underground structures.

3.4 STARTUP AND TESTING

A. Perform tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.

B. The tests shall include system capacity, control function, and alarm functions.

C. When any defects are detected, correct defects and repeat test at no additional cost or time to the Government.

D. The OWNER and ENGINEER will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the OWNER and ENGINEER. Provide a minimum notice of 10 working days prior to startup and testing.

3.5 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer's technical representative for 4 hours to instruct Personnel responsible in operation and maintenance of the system.

END OF SECTION

SECTION 22 14 13

STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install plumbing fixtures complete with accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before plumbing fixtures Work.

2. Notify other contractors in advance of installing plumbing fixtures to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before plumbing fixtures.

C. Related Sections:

1. Section 09 91 00, Painting.

2. Section 22 05 27, Pipe Sleeves for Plumbing.

3. Section 22 05 29, Hangers and Supports for Plumbing Piping and Equipment.

4. Section 22 07 19, Plumbing Piping Insulation.

5. Section 22 10 53, Installation of Plumbing Piping.

6. Section 22 10 63, Testing of Plumbing Piping Systems.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American National Standards Institute, (ANSI).
   a. ANSI B16.12, Cast-Iron Threaded Drainage Fittings.
   b. ANSI B125.2, Black/Hot-Dipped Zinc Coated Welded/Seamless Pipe.

2. American Society of Sanitary Engineering, (ASSE).

3. American Society for Testing and Materials, (ASTM).
   a. ASTM A 74, Specification for Cast-Iron Soil Pipe and Fittings.
   b. ASTM A 888, Specification for Hubless Cast-Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
   c. ASTM C 564, Specification for Rubber Gaskets for Cast-Iron Soil Pipe and Fittings.
   d. ASTM D 1785, Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.
   e. ASTM D 2665, Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings.

4. Cast-Iron Soil Pipe Institute, (CISPI).
   a. CISPI 310 Specification for Couplings for Use in Connection with Hubless Cast-Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
   b. CISPI HSN, Specification for Neoprene Rubber Gaskets for Hub and Spigot Cast-Iron Soil Pipe and Fittings.

5. Federal Specifications, (FS).
   a. FS QQ-C-40, Caulking Lead Wool and Lead Pig.

6. National Sanitation Foundation, (NSF).
   a. NSF 14: Plastic Piping System Components and Related Materials

1.3 QUALITY ASSURANCE

A. Installer's Qualifications:

1. Engage a single installer regularly engaged in sanitary piping installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to ENGINEER.

2. Engage a single installer for the storm drainage piping system with undivided responsibility for performance and other requirements.

B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Local and State Building Codes and Ordinances.

2. Permits: CONTRACTOR shall obtain and pay for all required permits, fees and inspections.

C. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single storm drainage piping system manufacturer.

2. The storm drainage piping systems manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the storm drainage piping systems manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. 1/4-inch scale piping layouts, dimensioned to show length of piping runs, pipe sizes, support spacing and expansion provisions.
   b. Details of installation, including piping supports.
   c. Submit pipe schedule with laminate construction, sizes, thickness, vacuum pressure, weight per foot pressure, spans, joint type and flange data.

2. Product Data:
   a. Manufacturer's literatures, illustrations, specifications and engineering data.
   b. Pipes and fittings.
   c. Roof drains.
   d. Cleanouts.
   e. Flexible connections.
   f. Other technical data related to the specified material and equipment as requested by ENGINEER.
   g. Gasket material.

B. Informational Submittals: Submit the following:

1. Qualifications Statements:
   a. Installer’s Qualifications

C. Record Documentation: Submit the following:

1. Record Drawings:
   a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of piping Work, submit CADD drawings showing the actual in place installation of all piping and equipment installed under this Section at a scale satisfactory to the OWNER. The drawings shall reflect all of the piping Work on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the piping systems. Two paper prints shall also be furnished. The prints and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

B. Storage of Materials:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 GENERAL REQUIREMENTS

A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.

B. The Drawings show an indication of the arrangement of equipment, piping, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. Piping, equipment, etc., found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case and adequately provide for expansion and perfect circulation and minimize the amount of space required for the same.

D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, CONTRACTOR, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the ENGINEER.

E. The Drawings do not show all offsets, fittings, accessories and details, which may be required. CONTRACTOR shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 PIPING

A. Cast-Iron Soil Pipe and Fittings:

1. Pipe and Fittings: ASTM A 74.

2. Weight: Service Weight.

3. Joints:
   a. Compression:
      (1) Gasket: Neoprene Rubber, ASTM C 564, CISPI HSN.
      (2) Lubricant: As recommended by pipe manufacturer.
   b. Caulked:
      (1) Lead: FS QQ-C-40, Type I, Grade AA.
      (2) Jute Packing: FS HH-P-117, Type I.

B. Hubless Cast-Iron:

1. No-Hub Pipe and Fittings: ASTM A 888.

2. Joints: CISPI 310.

2.2 DRAINS AND CLEANOUTS

A. Roof Drains: (RD-1):

1. Manufacturer: Provide products of one of the following:
   a. Jay R. Smith, Fig. 1010-R-Y-G-CIDG.
   b. Zurn Industries Fig. Z-100-R-C-G-GD.
   c. Or equal.

2. Materials:
   a. Body: Galvanized cast Iron.

b. Dome Top: Galvanized cast iron.

3. Accessories:
   a. Sump Receiver.
   b. Underdeck clamp.

4. Outlet Connections: Threaded, caulk or no-hub as required.

B. Cleanouts:
   1. Cleanout Deck Plate (FCO) (Traffic Areas):
      a. Products and Manufacturers: Provide one of the following:
         1) Jay R. Smith, Fig. No. 4258C.
         2) Zurn Industries, Fig. No. Z-1474.
         3) Or equal.
      b. Materials: Cast-iron body, flanged housing, cast-iron cover with fitting device.
      c. Outlet Connection: Caulk outlet.

   2. Wall Cleanout Plate:
      a. Products and Manufacturers: Provide one of the following:
         1) Jay R. Smith, Fig. 4472-BP.
         2) Josam Company, 58600-C Series.
         3) Or equal.
      b. Materials: Cast bronze taper thread plug.
      c. Accessories:
         1) Stainless steel round shallow wall plate.
         2) Cast-iron caulked ferrule.

2.3 PAINTING

A. All piping and accessories shall be painted in accordance with the requirements of Section 09 91 00, Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Install all items as shown, specified, and as recommended by the manufacturer.

   2. Request instructions from ENGINEER, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.

   3. Present conflicts to Engineer, in writing, who will determine corrective measures to be taken.

   4. Do not modify structures to facilitate installation of piping, unless specifically approved by ENGINEER.

5. Installation shall conform to requirements of all local and state codes.

6. Installation of pipe sleeves shall be in accordance with Section 22 05 27, Pipe Sleeves for Plumbing.

7. Installation of piping shall be in accordance with Section 22 10 53, Installation of Plumbing Piping.

8. Installation of hangers and supports shall be in accordance with Section 22 05 29, Hangers and Supports for Plumbing and Piping Equipment.

9. Protection: Properly plug or cap the open ends of all piping at the end of each day's Work or other stopping point through construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Tests: Water or smoke test piping in accordance with Section 22 10 63, Testing of Plumbing Piping Systems.

2. Fill all systems and fully test all equipment, valves, etc. in operation.

3. Check for excessive vibration while all systems are operating.

4. Installed systems and components will not be released to OWNER, unless all systems have been tested and approved by the ENGINEER.

B. Inspection:

1. Examine areas to receive piping, valves and accessories for:
   a. Defects that adversely affect execution and quality of the Work.
   b. Deviations beyond allowable tolerances for piping, valves and accessories.

2. Start the Work only when conditions are satisfactory.

3. The ENGINEER reserves the right to reject or authorize replacement of piping and accessories found to defective, blistered, cracked or deviated from allowable tolerances as described above.

3.3 ADJUSTING AND CLEANING

A. Adjusting:

1. While system is operable, balance all equipment, valves, etc. to achieve design conditions.

B. Cleaning:

1. Thoroughly clean all piping, fittings, valves, and accessories prior to installation.

2. Remove all dirt, rust, dust, etc. from piping in preparation for painting.

3. Remove and dispose of all debris and waste from the Site resulting from installation.

3.4 MATERIAL SCHEDULES

A. Piping:

1. Use types of pipe and fittings as specified below, unless otherwise specified or shown.

2. All exposed gravity storm drain piping run within the interior of a building shall be no-hub cast-iron.

3. Mechanical restraints shall be provided on fittings and couplings for storm piping 4-inches diameter and larger.

END OF SECTION

SECTION 22 15 19

COMPRESSED AIR SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install a complete and workable general-service compressed air system operating at 200 PSIG or less and including piping, valves and accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the compressed air system Work.

2. Notify other contractors in advance of installing Compressed Air system to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before the Compressed Air system..

C. Related Sections:

1. Section 09 91 00, Painting.

2. Section 22 05 27, Pipe Sleeves for Plumbing Piping.

3. Section 22 05 29, Hangers and Supports for Plumbing Piping and Equipment.

4. Section 22 10 53, Installation of Plumbing Piping.

5. Section 22 10 63, Testing of Plumbing Piping Systems.

6. Division 16, Electrical.

1.2 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

B. High-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures between 150 and 200 psig (1035 and 1380 kPa).

C. Low-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures of 150 psig (1035 kPa) or less.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Manufacturer shall have a minimum of five years of experience of producing substantially similar equipment and shall be able to show evidence of at least five installations in satisfactory operation for at least five years.

B. Installer Qualifications:

1. Extruded Tee Outlet procedure: Quality operators according to training provided by T-Drill Industries Inc., for making branch outlets.

2. Pressure-Seal Joining Procedure for Copper Tubing: Qualify operators according to training provided by Viega; Plumbing & Heating Systems.

3. Pressure-Seal Joining Procedure for Steel Piping. Qualify operators according to training provided by Victaulic Company.

C. ASME Compliance:

1. Comply with ASME B31.1, "Power Piping," for high-pressure compressed-air piping.

2. Comply with ASME B31.9, "Building Services Piping," for low-pressure compressed-air piping.

D. Regulatory Requirements:

1. Local and State Building Codes and Ordinances.

2. Permits: CONTRACTOR shall obtain and pay for all required permits, fees and inspections.

E. Component Supply and Compatibility:

1. Obtain all equipment included in this Section, regardless of the component manufacturer, from a single hot water heater manufacturer.

2. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the hot water heater equipment manufacturer.

1.4 SUBMITTALS

A. ACTION SUBMITTALS

1. Product Data: For the following:
   a. Plastic pipes, fittings, and valves.

b. Dielectric fittings.
c. Flexible pipe connectors.
d. Safety valves.
e. Pressure regulators. Include rated capacities and operating characteristics.
f. Automatic drain valves.
g. Filters. Include rated capacities and operating characteristics.
h. Lubricators. Include rated capacities and operating characteristics.
i. Quick couplings.
j. Hose assemblies.
k. Signage
l. Joining and sealant materials.
m. Instructions.
n. Materials of construction.
o. Data sheets.

2. Detailed description of each component.

3. Catalog cuts.

4. Complete equipment list.

5. Spare parts list and recommended quantities.

B. Test Reports:

1. Submit factory test reports.

2. Submit independent certification reports.

C. Operation and Maintenance Manuals: Submit complete manuals including:

1. Copies of all Shop Drawings, test reports, maintenance data and schedules, description of operation, and spare parts information, all in conformance with the requirements of Division 1.

D. Shop Drawings: Submit the following for approval:

1. 1/4-inch scale duct layouts, dimensioned to show length of piping runs, pipe sizes, support spacing and expansion provisions.

2. Details of installation, including piping supports.

3. Manufacturer's literature, illustrations, specifications and engineering data.

4. Flexible connections.

5. Other technical data related to the specified material and equipment as requested by ENGINEER.

6. Submit pipe schedule with laminate construction, sizes, thickness, vacuum pressure, weight per foot pressure, spans, joint type and flange data.

7. Gasket material.

8. Deviations from Contract Documents.

E. Record Drawings:

1. During progress of the Work keep an up to date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of piping work submit AutoCAD drawings showing the actual in place installation of all piping and equipment installed under this Section at a scale satisfactory to the ENGINEER. The drawings shall show all piping on plans and in sections, with all reference dimensions and elevations required for complete record drawings of the piping systems. Two paper prints shall also be furnished. The AutoCAD files and final prints shall be furnished no later than 30 days after completion of the Contract and prior to final payment.
a.

F. INFORMATIONAL SUBMITTALS

1. Qualification Data: For Installers.

2. Field quality-control test reports.

G. CLOSEOUT SUBMITTALS

1. Operation and Maintenance Data: For general-service compressed-air piping specialties to include in emergency, operation, and maintenance manuals.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Deliver materials to the site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

2. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the site. CONTRACTOR shall notify ENGINEER if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer’s instructions.

B. Storage of Materials:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

1.6 JOB CONDITIONS

A. Protection: Properly plug or cap the open ends of all piping at the end of each day's work or other stopping point through construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

1.7 GENERAL REQUIREMENTS

A. The Drawings accompanying these Specifications show the general arrangement and extent of work to be done, but the exact location and arrangement of all parts shall be determined as the work progresses, to conform in the best possible manner with its surroundings; the exact location of all parts of the work must be governed by the general building plans and the actual building conditions.

B. The Drawings are intended as an indication of the arrangement of equipment, ducts, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. It must however, be understood that the piping, equipment, ducts, etc. found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions, without additional charge.

C. The connections indicated to the various units are particularly intended as an indication only. The actual connections at the time of installation to be made and arranged as to fully and best suit the requirements of each particular case, adequately provide for expansion and perfect circulation and minimize the amount of space required for the same.

D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, or if piping or ductwork can be run to better advantage and at the same time accomplish as good or better results, CONTRACTOR, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval.

E. The Drawings preclude indicating thereon, all offsets, fittings, accessories and details, which may be required. CONTRACTOR shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of his work, and shall arrange his work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Drawings and Specifications.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Schedule 40, Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B, black with ends threaded according to ASME B1.20.1.

1. Malleable-Iron Fittings: ASME B16.3, Class 150 or 300, threaded with Black Finish.

2. Malleable-Iron Unions: ASME B16.39, Class 150 or 300, threaded with Black Finish

3. Unions: FS WW-U-531, Class 1, type B. Malleable Iron with Rating of 250 lb WOG.

4. Steel Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized seamless steel pipe. Include ends matching joining method.

5. Thread Tape: Teflon

B. Copper Tube: ASTM B 88, ANSI H23.1, Type K seamless, hard-drawn-temper, water tube.

1. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type.

2. Joints: ANSI/AWS-A5.8 Filler Metals for Brazing. Brazing Filler Metal: BCup-4, BCup-5

3. Copper Unions: ASME B16.22, FS WW-U-516 or MSS SP-123. Bronze Material with Ratings of 250 pound WOG.

C. Copper Push-on-Joint Fittings:

1. Description:
   a. Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22.
   b. Maximum 200 psig working-pressure rating at 250 deg F.
   c. Stainless-steel grip ring and EPDM-rubber O-ring seal.

2.2 VALVES

A. Bronze Body Globe Valves:

1. Manufacturer: Provide products of one of the following:
   a. Stockham Valves and Fittings, Fig. No. B-22.
   b. Lunkenheimer Company, Fig. No. 123.
   c. Or equal.

2. Type: Composition disc, union bonnet.

3. Materials: Brass and bronze.

4. Rating: 150 lb. SWP.

5. End Connections: Screwed ends.

B. Bronze Body Ball Valves:

1. Manufacturer: Provide products of one of the following:
   a. Nibco, Incorporated, Fig. No. S-585-70.
   b. Lunkenheimer Company, Fig. No. 707-XLT.
   c. Or equal.

2. Type: Non-blowout stem, adjustable packing gland, quarter turn, full port ball valve for air service and vacuum service as required. Valves shall be cleaned and degreased.

3. Materials:
   a. Body: Bronze.
   b. Ball: Bronze.
   c. Seats and Seals: Reinforced Teflon.

4. Rating: 600 psi WOG minimum.

5. End Connection: Threaded.

C. Bronze Body Check Valve:

1. Manufacturer: Provide products of one of the following:
   a. Lunkenheimer Company, Fig. No. 233.
   b. Walworth, Fig. No. S-97.

c. Or equal.

2. Type: Disc type, spring loaded lift check valve.

3. Materials and Construction:
   a. Body and Disc: Bronze.
   b. Spring: Stainless steel, Type 316.

4. Rating: 300 psi air.

5. End Connections: Threaded.

D. Bronze Body Pressure Regulating Valves:

1. Manufacturer: Provide products of one of the following:
   a. Cashco Division, Riley Company, Type "D".
   b. Or equal.

2. Type: Spring and diaphragm, single seat.

3. Materials:
   a. Body: Bronze.
   b. Trim: Stainless steel.
   c. Spring: Stainless steel.
   d. Valve seat: Metal.
   e. Diaphragm: Neoprene or Buna-N.

4. Maximum Inlet Pressure: 250 psig.

5. Outlet Pressure: Adjustable between 25 and 100 psig.

6. End Connection: Threaded.

E. Relief Valves:

1. Manufacturer: Provide products of one of the following:
   a. A.W. Cash Valve Manufacturing Corporation.
   b. Watts Regulator Company.
   c. Or equal.

2. Type: ASME Pressure relief valve only.

3. Materials: Bronze body, silicone seat disc, stainless steel springs, brass test lever.

4. Valve set to relieve as shown on Drawings.

F. Unions:

1. Dielectric Unions:
   a. Manufacturer: Provide products of one of the following:
      1) Watts Regulator Company.
      2) EPCO Sales Incorporated.

2. Reference: ANSI B16.39.

3. Type: Dielectric insulating type.

4. Pressure Ratings:
   a. Soldered Unions: 150 psig.
   b. Dielectric Unions: 250 psig.
   c. Flange Unions: 175 psig.

G. Pressure Gages:

1. Manufacturer: Provide pressure gauge(s) of one of the following:
   a. Ashcroft.
   b. Dwyer Instruments, Inc.
   c. Weksler Instrument Company.

2. Reference: ANSI B40.1 for Grade AA gages.

3. Range: Pressure range shall be selected:
   a. 0 to 200 psig in maximum increments of 2 psig.

4. Type: Glycerine-filled, dial type pressure gage.
   a. Construction:
      1) Case: 4 1/2-inch cast aluminum with black finish.
      2) Ring: Friction type-stainless steel.
      3) Window: Glass or clear acrylic plastic.
      4) Dial: White with black markings and graduations.
      5) Pointer: Micrometer type with black finish.
      6) Movement: Stainless steel rotary type.
      7) Bourdon Tube/Socket: Phosphor bronze tube, silver brazed to forged brass socket and tip, 1/4-inch NPT.
      8) Accuracy: ANSI B 40.1, Grade 2A-1/2 percent of scale range.

5. Isolation Valve:
   a. Type: Needle valve.
   b. Construction: Brass body, seat, stem, and tee handle.
   c. Packing: Teflon.
   d. Maximum Operating Pressure: 2,000 psi.
   e. Maximum Operating Temperature: 300 F.

6. Gauge cock isolation valve not acceptable.

H. Link Seals: Provide mechanical seals with adjusting bolts suitable for 20 psi working pressure where shown or specified.

1. Materials: Mechanical seals through walls or floors; two independent mechanical seal assemblies required for each penetration.
   a. Pressure Plate: Low carbon steel, zinc galvanized plated.
   b. Bolt and Nut: Low carbon steel zinc galvanized.
   c. Sealing Element: Silicone rubber.
   d. 3-hour fire rating at fire rated assemblies.

2. Manufacturers: Provide products of one of the following:
   a. Thunderline Corporation.
   b. Calpico, Inc.
   c. Or equal.

I. Piping Markers:

1. Manufacturer: Provide products produced by one of the following:
   a. Seton Name Plate Corporation.
   b. New York Stencil Works.
   c. Or equal.

2. General:
   a. Piping markers shall be formed from laminated plastic. All printing shall be sealed with a formed butyrate plastic film. Markers for piping up to 6-inch diameter shall be preformed to completely wrap around the pipe requiring no adhesive.
   b. Each marker shall consist of at least one legend descriptive of the function of the pipe in accordance with the OWNER's piping designation and a directional arrow indicative of flow.
   c. The size of lettering and marker shall conform to ANSI A13.1.
   d. Location of Markers:
   e. Adjacent to each valve and "T" connection.
   f. At each branch and riser takeoff.
   g. At each pipe passage through a wall, floor and ceiling.
   h. On all horizontal and vertical pipe runs at 25-foot intervals.

J. Pipe Drains:

1. Type: Bronze compression-type globe valve with hose end.

2. Rating: 150 pound SWP.

3. Size: 3/4 inch.

2.3 SPECIALTIES

A. Safety Valves: ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," construction; National Board certified, labeled, and factory sealed; constructed of bronze body with poppet-type safety valve for compressed-air service.

1. Pressure Settings: Higher than discharge pressure and same or lower than receiver pressure rating.

B. Air-Line Pressure Regulators: Diaphragm operated, aluminum alloy or plastic body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for [200-psig (1380-kPa)] <Insert pressure> minimum inlet pressure, unless otherwise indicated.

C. Automatic Drain Valves: Stainless-steel body and internal parts, rated for [200-psig (1380-kPa)] <Insert pressure> minimum working pressure, capable of automatic discharge of collected condensate.[Include mounting bracket if wall mounting is indicated.]

D. Air-Line Lubricators: With drip chamber and sight dome for observing oil drop entering air stream; with oil-feed adjustment screw and quick-release collar for easy bowl removal with mounting bracket.

E. HOSE ASSEMBLIES

1. Description: Compatible hose, clamps, couplings, and splicers suitable for compressed-air service, of nominal diameter indicated.

2. Hose: Reinforced double-wire-braid, CR-covered hose for compressed-air service.

3. Hose Clamps: Stainless-steel clamps or bands.

4. Hose Couplings:
   a. Two-piece, straight-through, threaded brass or stainless-steel O-ring or gasket-seal swivel coupling with barbed ends for connecting two sections of hose.
   b. Brass couplers shall be provided for connection to OWNER furnished air hoses. Coordinate coupler requirements with air hose sizes.

5. Hose Splicers: One-piece, straight-through brass or stainless-steel fitting with barbed ends for connecting two sections of hose.

6. Service air hose stations shall be provided where shown on the drawings.

7. Service air hose stations shall be provided as combination units consisting of filter, regulator, pressure gage, lubricator and connection fittings.

8. Filter:
   a. Centrifugal action.
   b. 40 micron element.

9. Air Regulator;
    a. Adjustable outlet pressure.

10. Air Lubricator:
    a. Adjustable dispense rate.
    b. Control knob.
    c. Site window.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install all items as shown, specified, and as recommended by the manufacturer.

2. Request instructions from ENGINEER when there is a conflict between the manufacturer's recommendations and the Contract Documents.

3. Present conflicts between piping systems and/or equipment and/or structures to ENGINEER who will determine corrective measures to be taken.

4. Do not modify structures to facilitate installation of piping unless specifically approved by ENGINEER.

5. Installation to conform to requirements of all local and state codes.

6. Piping shall be tested at a minimum pressure of 200 psig for not less than a 4 hour interval.

7. All piping shall be pitched to facilitate draining. Drain valves shall be provided at system low points.

8. Unions shall be provided for all screwed piping at connections to equipment and at convenient locations to permit disassembly of piping.

9. All connections between ferrous and non-ferrous piping materials shall be made with dielectric couplings.

10. Wherever changes in sizes of piping occur, changes shall be made with reducing fittings. The use of bushings is not permitted unless otherwise shown.

11. All pipes passing through ceilings, cabinets and walls in finished rooms shall have escutcheon plates.

12. Provide shut-off valves for isolation of each branch from main and for isolation of each connection to each piece of equipment.

13. Branch connections shall be taken off from the top of headers.

14. Bolt packaged air compressor to concrete base.

15. Installation of piping shall be in accordance with Section 15490, Installation of Plumbing Piping.

16. Installation of hangers and supports shall be in accordance with Section 15422, Pipe Hangers, Supports and Restraints – Plumbing.

17. Coordinate final unit location with Division 16, Electrical.

3.2 FIELD QUALITY CONTROL

A. Field Tests

1. Fill all systems and fully test all equipment, valves, dampers, etc. in operation.

2. Check for excessive vibration while all systems are operating.

3. Installed systems and components will not be released to OWNER unless all systems have been tested and approved by the ENGINEER.

B. Inspection:

1. Examine areas to receive equipment, piping, valves and accessories for:
   a. Defects that adversely affect execution and quality of Work.
   b. Deviations beyond allowable tolerances for equipment, piping, valves and accessories.
   c. Start work only when conditions are satisfactory.

2. The ENGINEER reserves the right to reject and/or authorize replacement of equipment, piping and accessories found to defective, blistered, cracked and/or deviated from allowable tolerances as described above.

3.3 ADJUSTING & CLEANING

A. Adjusting:

1. Adjust all controls for proper settings.

2. While system is operable, balance all equipment, valves, dampers, etc. to achieve design conditions.

B. Cleaning:

1. Thoroughly clean all piping, fittings, valves, equipment and accessories prior to installation.

2. Remove all dirt, rust, dust, etc. from piping and equipment in preparation for painting.

3. Remove and dispose of all debris and waste from the site resulting from installation.

3.4 MATERIAL SCHEDULES

1. Use types of pipe and fittings as specified below unless otherwise specified or shown.

2. All compressed air piping run within the interior and exterior of the building shall be copper, Type K.

3. Compressed air intake piping only may be welded steel as an alternative to Copper, Type K.

4. All valves on copper pipe systems shall be bronze bodied unless specified otherwise.

5. Use "wrought copper" fittings for copper tubing.

6. Steel piping maybe used in non-corrosive areas such as mechanical and electrical rooms only and as approved by the Owner.

7. Use "butt welded" fittings for welded steel pipe connections.

B. Drain Piping:

1. Type M copper tube; copper-push fittings.

END OF SECTION

SECTION 22 33 00

DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install domestic water heaters complete with accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before domestic water heaters Work.

2. Notify other contractors in advance of installing domestic water heaters to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before domestic water heaters Work.

C. Related Sections:

1. Section 09 91 00, Painting.

2. Section 22 05 29, Hangers and Supports for Plumbing Piping and Equipment.

3. Section 22 11 16, Domestic Water Piping.

4. Section 26 05 05, General Provisions for Electrical Systems.

5. Section 26 28 16.33, Disconnect Switches.

6. Section 40 05 93, Common Motor Requirements for Process Equipment.

7. Section 40 05 96, Vibration, Seismic, and Wind Controls.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASME Boiler and Pressure Vessel Code.

2. ASME/ANSI Z21.22, Relief Valves for Hot Water Supply Systems.

3. ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.

4. NSF/ANSI 61, Drinking Water System Components – Health Effects.

5. NSF/ANSI 372, Drinking Water System Components – Lead Content

6. UL 1453, Electric Booster and Commercial Storage Tank Water Heaters.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Shall have minimum of five years experience producing equipment substantially similar to that required, and shall be able to document evidence of at least five installations in satisfactory operation for at least five years each.

B. Component Supply and Compatibility:

1. Obtain each type of domestic water heater equipment included in this Section, regardless of component manufacturer, from one domestic water heater equipment manufacturer.

2. Each domestic water heater manufacturer shall review and approve, or shall prepare, all Shop Drawings and other submittals for components furnished under this Section for the particular equipment type.

3. Materials and equipment shall be suitable for the required service conditions and shall be integrated into each assembly by the associated domestic water heater manufacturer.

C. Regulatory Requirements: Comply with Laws and Regulations, including the following.

1. All applicable State and Local codes and Ordinances.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Schedule of domestic water heaters for the Project, indicating for each the installation location, model or type, and other distinguishing information.
   b. Drawings showing fabrication methods, assembly, accessories, and installation details.

c. Detailed drawings of each equipment item's and component's wiring diagrams.
d. Detailed installation drawing of each individual component showing:
   1) Mounting requirements.
   2) Item locations, such as in a panel, installed on floor, or elsewhere.
   3) Piping and wiring connections labeled and coded.
   4) Data sheets.
e. Detailed description of each component.

2. Product Data:
   a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all equipment.

B. Informational Submittals: Submit the following:

1. Manufacturer's Instructions:
   a. Special shipping, storage and protection, and handling instructions.
   b. Installation data for the equipment, including setting drawings, templates, and directions for installing anchorage devices.

2. Source Quality Control Submittals:
   a. Submit results of required factory tests and inspections.

3. Qualifications Statements:
   a. Manufacturer, when submittal of qualifications is required by ENGINEER.

C. Closeout Submittals: Submit the following:

1. Operations and Maintenance Data:
   a. Submit in accordance with Section 01 78 23, Operations and Maintenance Data.
   b. Include maintenance data and schedules, description of operation, wiring diagrams, and list of spare parts recommended for one year of operation with current price list.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Deliver materials and equipment to Site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in concrete in ample time to prevent delaying the Work.

2. Comply with Section 01 65 00, Product Delivery Requirements.

B. Storage and Protection:

1. Store materials and equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

2. Comply with Section 01 66 00, Product Storage and Handling Requirements.

1.6 QUALITY ASSURANCE

A. All products are to be certified NSF 61 and NSF 372 lead-free, all electrical components are to be UL Listed for specific use, and all systems are to be third-party certified to all applicable equipment standards.

PART 2 - PRODUCTS

2.1 ELECTRIC WATER HEATER

A. Electric Water Heater –EWH-1.

1. Heater Type: Electric with UL label.

2. Service Conditions:
   a. Nominal Capacity: 80 gallons.
   b. Minimum Recovery Rate: 49 gallons per hour at 100 degrees F water temperature rise.
   c. Working pressure: 150 psig.

3. Products and Manufacturers: Provide one of the following:
   a. A.O. Smith, Model DEN-80.
   b. Lochinvar Corporation LHS-80
   c. Or equal.

4. Heater Style: Standard vertical.

5. Materials:
   a. Tank: Welded steel.
   b. Tank Lining: Glass-lining, fired to minimum temperature of 1,400 degrees F.
   c. Outer Shell: Steel with baked enamel finish.
   d. Insulation: Polyurethane foam.
   e. Cathodic Protection Anode: High-density magnesium.
   f. Water Connections: Brass.
   g. Base and Legs: Steel or cast-iron.

6. Heaters shall not have:
   a. Sharp edges.
   b. Scratches on enameled surfaces.
   c. Loose fasteners.
   d. Loose panels.
   e. Dents on outer jacket.

7. Electric Heat Source:
   a. Heating Element and Operation: Immersion type, 12.2 KW element.
   b. Heating Elements: Heavy-duty with incoloy sheaths and ceramic terminal blocks.
   c. Power Supply: 480-volt, three-phase, 60 Hertz.

8. Controls:
   a. Fused transformer for 120-volt control circuit power.
   b. Thermostat: Immersion type. 110 degrees F to 170 degrees F adjustable water temperature range, set at 140ºF.
   c. Element operation shall be simultaneous switched through individual magnetic contactors.
   d. Manual reset high temperature cut-off. High limit energy cut-off to interrupt electrical current in event water inside heater tank exceeds 200 degrees F.
   e. Local power disconnect switch to be provided under Division 26, Electrical.

9. Water Connections: 3/4-inch diameter inlet and outlet pipe nipples for connections to water piping system.

10. Drain Valve: Manufacturer's standard drain valve on front at tank bottom or lower side to completely drain tank.

11. Source Quality Control: Perform hydrostatic test on tank at the factory at 300 psi. Duration of test shall be manufacturer's standard. Criteria for acceptance: Zero leakage.

12. Standards: Comply with UL 1453, NSF 61, NSF 372, and ASHRAE 90.1.

2.2 ACCESSORIES

A. Temperature and Pressure Relief Valve: Provide one of the following on each storage-type water heater unit furnished:

1. Valve: Temperature and pressure relief valve in accordance with ASME/ANSI Z21.22.

2. Capacity and size of valve to relieve heater capacity at specified temperatures and pressure setting of domestic water heater tank.

3. Settings:
   a. Temperature Relief Setting: 210 degrees F.

b. Pressure Relief Setting: 150 psig.

B. Cathodic Protection for Water Heaters with Tanks: Provide rigidly-supported anode rods in heater tank.

C. Vacuum Breakers: Provide one for each storage-type water heater furnished:

1. Products and Manufacturers: Provide one of the following:
   a. Watts LFN36, Vacuum Relief Valve.
   b. Cash Acme, VR-801, Lead-Free
   c. Or equal.

D. Pre-Pressurized Expansion Tank: Provide where shown or indicated on the Drawings:

1. Type: Diaphragm type pre-pressurized expansion tank designed for potable hot water systems.

2. Service Conditions:
   a. Tank Volume: 5 gallons
   b. Maximum Working Pressure: 125 psig.
   c. Maximum Working Temperature: 200 degrees F.

3. Products and Manufacturers: Provide one of the following:
   a. Amtrol, Incorporated, Therm-X-Trol, ST Series.
   b. Watts Regulator, Model DET.
   c. Or equal.

4. Construction:
   a. Shell: Welded carbon steel.
   b. Diaphragm: Heavy-duty butyl rubber or comparable material for intended service. Schrader valve tapping.
   c. Heads: Dished.
   d. Polypropylene-lined water reservoir.

5. Factory Charge: Precharged to 40 psig.

6. Finish: Factory-applied primer coat, to be compatible with required field painting specified in Section 09 91 00, Painting.

7. Standards: Equpiment shall be listed in NSF/ANSI 61.

2.3 FINISHING

A. Factory-paint ferrous surfaces in accordance with Section 09 91 00, Painting. Do not paint enameled surfaces, stainless steel, brass, chrome-plated, and other finished surfaces.

2.4 SOURCE QUALITY CONTROL

A. All equipment shall be completely manufactured and pre-assembled in accordance with applicable reference standards indicated in this Section. Perform the following tests and inspections at factory before shipment:

1. For each assembled unit, test and inspect equipment in accordance with UL requirements.

2. Test and inspect in accordance with ASME Boiler and Pressure Vessel Code.

3. Perform hydrostatic testing tanks as required in this Section for individual equipment items.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:

1. Thoroughly clean materials, equipment, and accessories prior to installation.

2. Install items as in accordance with the Contract Documents, Laws and Regulations, manufacturer's recommendations, and good practice. Obtain interpretation from ENGINEER if manufacturer's instructions or Laws or Regulations conflict with the Contract Documents.

3. Do not modify structures or facilities to facilitate installation of equipment without approval of ENGINEER.

4. Provide each domestic water heater with shut off valves for required water supplies.

3.3 FIELD QUALITY CONTROL

A. Site Tests:

1. ENGINEER shall witness field tests.

2. Fill all systems and verify that equipment, valves, and appurtenances operate successfully and in accordance with the Contract Documents.

3. Check for excessive vibration while systems are operating.

4. For materials and equipment that do not successfully pass field tests, make repairs or modifications and retest until acceptable results are achieved.

B. Manufacturer's Services: Provide a qualified, factory trained serviceman to perform the following:

1. Supervise installation of equipment.

2. Instruct CONTRACTOR in installing equipment.

3. Inspect and adjust equipment after installation and ensure proper operation.

4. Instruct operations and maintenance personnel in operation and maintenance of the equipment.

5. Manufacturer's technician shall make visits to the Site as follows:
   a. First visit shall be for instructing CONTRACTOR in proper equipment installation, and assisting in installing equipment. Minimum number of hours on-Site: 2 hours.
   b. Second visit shall be for checking completed installation, start-up of system; and performing field quality control testing. Minimum number of hours on-Site: 2 hours.
   c. Third visit shall be to instruct operations and maintenance personnel.
      1) Furnish services of manufacturer's qualified, factory-trained specialists to instruct OWNER's operations and maintenance personnel in recommended operation and maintenance of equipment.
      2) Training requirements, duration of instruction, and qualifications shall be in accordance with Section 01 79 23, Instruction of Operations and Maintenance Personnel.
      3) Number of hours on-Site shall be in accordance with Section 01 79 23, Instruction of Operations and Maintenance Personnel.
   d. Technician shall revisit the Site as often as necessary until installation is acceptable.

6. All costs, including expenses for travel, lodging, meals and incidentals, and cost of travel time, for visits to the Site shall be included in the Contract Price.

3.4 ADJUSTING AND CLEANING

A. Adjusting:

1. Adjust controls for proper settings.

2. While system is operable, balance all equipment, including valves, appurtenances, and similar equipment, to achieve specified service conditions.

3. Adjust thermostats to desired water outlet temperature.

B. Cleaning:

1. Upon completion of the Work, remove all non-permanent labels, and remove dirt, grease, markings, and other objectionable matter from equipment.

2. In preparation for painting, remove dirt, rust, dust, and objectionable materials from materials and equipment.

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install plumbing fixtures complete with accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before plumbing fixtures Work.

2. Notify other contractors in advance of installing plumbing fixtures to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before plumbing fixtures.

C. Related Sections:

1. Section 09 90 00, Painting.

2. Section 22 11 16, Domestic Water Piping

3. Section 22 13 16, Sanitary Waste and Vent Piping.

4. Section 22 07 19, Plumbing Piping Insulation.

5. Section 22 05 93, Disinfection of Plumbing Systems.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ANSI/ASME A112.19.1, Enameled Cast Iron and Enameled Steel Plumbing Fixtures.

2. ANSI/ASME A112.19.2, Vitreous China Plumbing Fixtures and Hydraulic Requirements for Water Closets and Urinals.

3. ANSI/ICC A117.1, Accessible and Usable Buildings and Facilities.

4. ASHRAE 18, Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration.

5. ASME A112.6.1M, Floor-affixed Supports for Off-the-floor Plumbing Fixtures for Public Use.

6. ASME A112.18.1, Plumbing Supply Fittings.

7. ASME A112.18.2, Plumbing Waste Fittings.

8. ASME A112.19.3, Stainless Steel Plumbing Fixtures.

9. ASSE 1016, Performance Requirements for Individual Thermostatic, Pressure Balancing, and Combination Control Valves for Individual Fixture Fittings.

10. ASSE 1037, Performance Requirements for Pressurized Flushing Devices for Plumbing Fixtures.

11. ASSE 1070, Performance Requirements for Water-temperature Limiting Devices.

12. AWWA C651, Disinfecting Water Mains.

13. FS WW-P-541/1, Plumbing Fixtures (Water Closets).

14. FS WW-P-541/8, Plumbing Fixtures-Land Use.

15. NSF 61: Drinking Water System Components – Health Effects.

16. NSF 372: Drinking Water System Components – Lead Content.

17. UL 399, Standard for Drinking-Water Coolers

18. US EPA WaterSense Program Certification and Labeling.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Shall have minimum of five years' experience producing equipment substantially similar to that required, and shall be able to document evidence of at least five installations in satisfactory operation for at least five years each.

B. Component Supply and Compatibility:

1. Obtain each type of plumbing fixture included in this Section, regardless of component manufacturer, from one plumbing fixtures and trim manufacturer.

2. Each plumbing fixtures and trim manufacturer shall review and approve, or shall prepare, all Shop Drawings and other submittals for components furnished under this Section for the particular fixture type.

3. Materials and equipment shall be suitable for the required service conditions and shall be integrated into each assembly by the associated plumbing fixtures and trim manufacturer.

C. Regulatory Requirements: Comply with Laws and Regulations, including the following.

1. Local and State Codes and Ordinances.

2. ADAAG, Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Schedule of plumbing fixtures and trim for the Project, indicating for each the installation location, model or type, and other distinguishing information.
   b. Drawings showing fabrication methods, assembly, accessories, installation details and wiring diagrams.
   c. Detailed installation drawings of each individual components showing:
      1) Mounting requirements.
      2) Piping and roughing connections, labeled and coded.
      3) Instructions.
      4) Materials of construction.
      5) Data sheets.
   d. Detailed description of each component.

2. Product Data:
   a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all equipment.

B. Informational Submittals: Submit the following:

1. Manufacturer's Instructions:
   a. Special shipping, storage and protection, and handling instructions.
   b. Installation data for the equipment, including setting drawings, templates, and directions for installing anchorage devices.

2. Field Quality Control:
   a. Submit results of bacteriological testing.

3. Qualifications Statements:
   a. Manufacturer, when submittal of qualifications is required by ENGINEER.

C. Closeout Submittals: Submit the following:

1. Operations and Maintenance Data:
   a. Submit in accordance with Section 01 78 23, Operations and Maintenance Data.
   b. Include maintenance data and schedules, description of operation, wiring diagrams, and list of spare parts recommended for one year of operation with current price list.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Deliver materials and equipment to Site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in concrete in ample time to prevent delaying the Work.

2. Comply with Section 01 65 00, Product Delivery Requirements.

B. Storage and Protection:

1. Store materials and equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

2. Comply with Section 01 66 00, Product Storage and Handling Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. Exposed valves and escutcheons shall be chrome plated.

2. Where applicable, materials and equipment furnished shall comply with FS WW-541/8.

3. Provide materials and equipment with USEPA WaterSense label, when products with label are available from at least one manufacturer.

4. All faucets, supply kits, stop valves, and other components to be installed in the domestic water system are to be certified NSF 61/NSF 372 lead-free.

5. All tempered water supplies for lavatory faucets or other handwashing fixtures are to be provided with anti-scalding valves conforming to ASSE 1070. Anti-scalding valves to be as specified in section 22 11 16, Domestic Water Piping, except that faucets with integral ASSE 1070 compliant temperature limiting devices do not require a valve to be installed on the fixture supply.

B. Water Closet – Type WC-1:

1. Products and Manufacturers: Provide one of the following:
   a. American Standard 2257.101.
   b. Zurn, Fig. No. Z5615.
   c. Kohler K-84325.
   d. Or equal.

2. Type: Flush-valve, siphon jet, high efficiency type, 1.28 gallons per flush.

3. Style: Wall-hung, elongated bowl.

4. Standards: Comply with ANSI A112.19.2 and ANSI/ICC A117.1.

5. Accessories:
   a. Flush Valve and Vacuum Breaker:
      1) Products and Manufacturers: Provide one of the following:
         a) Sloan, “Royal” Model No. 111-1.28.
         b) Zurn Z-6000 Series.
         c) Or equal.
      2) ASME A112.19.2, ASSE 1037, US EPA WaterSense Certified.
   b. Seat and Cover:
      1) Products and Manufacturers: Provide one of the following:
         a) Church Division of Bemis Manufacturing, #9500C.
         b) Kohler, Fig. No. K-4666-C.
         c) Or equal.
      2) Standards: Comply with FS WW-P-541/1, Type IV, Class 2.
      3) Type: Solid plastic, elongated, open front.
      4) Color: White.

C. Lavatory – Type L-1:

1. Products and Manufacturers: Provide one of the following:
   a. Zurn Z5318
   b. Kohler
   c. Or equal.

2. Type: Flat slab, drilled for concealed arm support.

3. Material: Vitreous china.

4. Size: 20-inch wide by 18-inch deep.

5. Standards: ASME A112.19.2, ANSI A117.1.

6. Faucets:
   a. Products and Manufacturers: Provide one of the following:
      1) Kohler K-2028-8.
      2) American Standard
      3) Zurn
      4) Or equal.
   b. Type: Two Handle 4-inch center-set Lavatory Faucet, with metal pop-up drain and ceramic disc valves.
   c. Material: Chrome plated brass.
   d. Standards : ANSI A117.1, ASSE 1070, ASME A112.18.1, NSF 61/NSF 372.

7. Supplies:
   a. Products and Manufacturers: Provide one of the following:
      1) Brass Craft Part No. KTSCS400AX C.
      2) McGuire Manufacturing Model LF172LK.
      3) Or equal.
   b. Description: Lead-free ½" Sweat x 3/8" compression rigid riser supply kit with escutcheon flange and loose-key angle stops, to be installed on hot and cold water supplies.
   c. Material: Chrome plated brass.
   d. Standards: ASME A112.18.1, NSF 61/NSF 372.

8. Drain:
   a. Products and Manufacturers: Provide one of the following:
      1) Kohler, Model K-7715.
      2) McGuire Manufacturing, Model 155A.
      3) Or equal.
   b. Description: Cast grid strainer with 1.25-inch tailpiece assembly, chrome-plated.
   c. Standards: ASME A112.18.2.

9. Trap:
   a. Products and Manufacturers: Provide one of the following:
      1) Kohler, Model K-8999.
      2) McGuire Manufacturing, Model 8902C.
      3) Or equal.
   b. Description: Adjustable cast brass "P" trap with cleanout. Slip joint inlet and 17-gage tubing outlet to wall with escutcheon, 1.25-inch inlet by 1.5-inch outlet, chrome finish.
   c. Standards: ASME A112.18.2.

10. Carrier:
    a. Products and Manufacturers: Provide one of the following:
       1) Jay R. Smith, Fig. No. 700.
       2) Zurn Industries.
       3) Or equal.
    b. Description: Floor-mounted concealed arm carrier for flat slab lavatories with chrome-plated escutcheons.
    c. Standards: ASME A112.6.1M.

11. Insulation: As specified in Section 22 07 19, Plumbing Piping Insulation.

D. Sink - S-1:

1. Products and Manufacturers: Provide one of the following:
   a. Elkay Model # LRAD 221955
   b. Just Manufacturing
   c. Or equal.

2. Type: Single Compartment Bowl. Self rimming and undercoated, with ledge back drilled for trim, ADA compliant.

3. Material: 18 gage, Type 304 stainless steel with Lustertone finish.

4. Size: 22" x 19 x 5-1/2" outside dimensions.

5. Faucets:
   a. Products and Manufacturers: Provide one of the following:
      1) Elkay LK406GN05L2.
      2) Chicago Faucets 895-GN2ACP
      3) Or equal.
   b. Type: 8" Center-set with Exposed Deck Faucet with 5" Wrist-blade Chrome Handles.
   c. Flow rate of 1.5 GPM, and, with a Quarter Turn Ceramic Disc valve. 1/2" NPS male connection.
   d. Standards: ANSI A117.1, ASSE 1070, ASME A112.18.1, NSF 61/NSF 372.

6. Point of use thermostatic mixing valve: 3/8' inlet and outlet, lead free bronze body, locked temperature adjustment cap, vandal resistant, copper thermostat assembly with polymer thermoplastic shuttle, stainless steel springs, integral check valves on hot and cold-water inlets, compression fittings.

7. Trap:
   a. Products and Manufacturers: Provide one of the following:
      1) Kohler, Model K-8999.
      2) McGuire Manufacturing, Model 8902C.
      3) Or equal.
   b. Description: Adjustable cast brass “P” trap with cleanout. Slip joint inlet and 17-gage tubing outlet to wall with escutcheon, 1.25-inch inlet by 1.5-inch outlet, chrome finish.
   c. Standards: ASME A112.18.2.

E. Service Sink - S-2:

1. Products and Manufacturers: Provide one of the following:
   a. EL Mustee & Sons Model 12C
   b. Fiat Products Model TAT-1
   c. Or equal.

2. Type: Floor mounted service sink.

3. Material: Molded stone.

4. Combo Pack includes:
    a. 6-inch swing spout faucet with aerator and hose end.
    b. Two flexible supply lines and seal tape.
    c. 1-1/2 PVC P-trap with 12” tail piece.
    d. Drain Stopper.

F. Bottle Filler -BF-1:

1. Products and Manufacturers: Provide one of the following:
    a. Elkay Manufacturing Company, Model LZWSM8K with replacement filter WSK6000R.
    b. Halsey Taylor, Model HTHBSM-WF with filter WSF6000R and remote chiller SJ8.
    c. Or equal.

2. Style:
    a. Wheelchair type Surface Mounted.
    b. Touchless, sensor operated.

3. Materials:
    a. Satin-finish stainless steel.

4. Fixture mounting:
    a. Surface Mounted.

5. Standards: ANSI/NSF 61/372, ADA and ICC A117.1, UL399

G. Mop Sink - MS-1:

1. Products and Manufacturers: Provide one of the following:
    a. Acorn, Model TSR-28
    b. Stern-Williams CRS-2200
    c. Or equal.

2. Type: Floor mounted mop sink.

3. Material: Precast Terrazzo.

4. Size: 28" x 28 x 12".

5. Accessories
    a. Faucets:
        1) Products and Manufacturers: Provide one of the following:
            a) Chicago Faucet Model #835-369CP.
            b) Central Brass Co., Model 0471-RC
            c) Or equal.
    b. Type: Wall Mounted manual faucets with 6” oncenter.
    c. ½” Supplies from top.
    d. Integral stops with integral backflow check valves.
    e. Flow rate: 2.5 GPM.
    f. 3/4” hose thread on spout with bucket hooks 8” on center
    g. Standards: ASSE A112.18.1-201/CSA B125.1

6. Drain:
   a. Integral 3-inch drain with stainless steel strainer

7. Hose and Wall Bracket

8. Mop Hanger

9. Stainless steel shelf.

10. Trap:
    a. Products and Manufacturers: Provide one of the following:
       1) Kohler, Model K-8999.
       2) McGuire Manufacturing, Model 8902C.
       3) Or equal.
    b. Description: Adjustable cast brass “P” trap with cleanout. Slip joint inlet and 17-gage tubing outlet to wall with escutcheon, 1.25-inch inlet by 1.5-inch outlet, chrome finish.
    c. Standards: ASME A112.18.2.

2.2 FINISHING

A. Factory-paint ferrous surfaces in accordance with Section 09 90 00, Painting. Do not paint porcelain, china, enameled surfaces, stainless steel, brass, chrome-plated, and other finished surfaces.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests:

1. Factory-test equipment ensure that entire equipment system is properly fabricated and assembled, that all controls function as specified in accordance with the Contract Documents, and that equipment complies with the Contract Documents and approved Shop Drawings and approved CONTRACTOR’s other submittals.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:

1. Thoroughly clean materials, equipment, and accessories prior to installation.

2. Install items as in accordance with the Contract Documents, Laws and Regulations, manufacturer's recommendations, and good practice. Obtain interpretation from ENGINEER if manufacturer's instructions or Laws or Regulations conflict with the Contract Documents.

3. Do not modify structures or facilities to facilitate installation of fixtures without approval of ENGINEER.

4. Provide each fixture with shut off valves or stops for required water supplies.

5. All fixtures are to be provided with all required mounting hardware for a complete installation as described in the manufacturer installation instructions or as otherwise required.

6. All fixtures are to be installed in perfect working condition at the completion of work.

B. Installation of Specific Fixture Types:

1. Handicap Fixtures:
   a. Provide insulation for all plumbing piping under handicapped lavatories.
   b. Install the following with vertical distance of 1.5 feet from floor to top of seat:
      1) Water Closet, Handicapped – Type WC-2
      2) Water Closet, Handicapped – Type WC-1W
   c. Urinals – UR-1: For handicap application, mount urinal so that top of urinal rim is 17 inches above finish floor.

3.3 FIELD QUALITY CONTROL

A. Field Tests:

1. ENGINEER shall witness field tests.

2. Operating Tests:
   a. Fill all systems and verify that equipment, fixtures, valves, and appurtenances operate successfully.
   b. Load-test in accordance with manufacturer recommendations each wall-hung fixture after installation.

3. For materials and equipment that do not successfully pass field tests, make repairs or modifications and retest until acceptable results are achieved.

4. Bacteriological Testing: Perform bacteriological testing on water samples obtained following disinfection of fixtures and trim. Obtain samples in accordance with AWWA C651. Pay for testing at laboratory certified by authority having jurisdiction for potable water system bacteriological testing. Criteria for acceptance shall be in accordance with AWWA C651.

3.4 ADJUSTING AND CLEANING

A. Adjusting:

1. Adjust all controls for proper settings.

2. While system is operable, balance all equipment, including valves, appurtenances, and similar equipment, to achieve design conditions.

B. Cleaning:

1. Upon completion of the Work, remove all labels, and remove dirt, grease, markings, and other objectionable matter from fixtures and trim.

2. In preparation for painting, remove dirt, rust, dust, and objectionable materials from materials and equipment.

3.5 DISINFECTING

A. Prior to placing potable water system into service, disinfect equipment, piping, and accessories in accordance with Section 22 05 93, Disinfection of Plumbing Systems.

B. Prior to placing potable water system into service, disinfect equipment, piping and accessories in accordance with AWWA C651, Laws, and Regulations, and requirements of authorities having jurisdiction. Perform bacteriological testing in accordance with Article 3.3 of this Section.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING

SECTION 23 01 00

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Basic Mechanical Requirements specifically applicable to Division 23 sections, in addition to Division 01 - General Requirements.

1.2 PERFORMANCE

A. All work shall be performed in cooperation with the Owner, Architect, and all other contractors. The Mechanical Contractor shall coordinate all work with the construction schedule established by the Owner and Architect and shall immediately report any delays in materials receipt including circumstances causing the delays.

1.3 INSTALLATIONS

A. Layout of equipment, ductwork, piping, etc. is diagrammatic. Check project drawings prior to making installations for interferences with other trades. Should the contractor find such interferences, he shall be responsible for coordinating his work with the other responsible trades. Owner reserves the right to make reasonable changes prior to "roughing-in" without added expense. Dimensions shown are subject to verification of exact site conditions. Do not scale the drawings.

B. If larger access openings are required to install new equipment, it is this contractor's responsibility to make access (cut) in the building and repair/replace (patch) access to match existing. Packaged equipment disassembly and reassembly for same is also the responsibility of this contractor.

C. Minimum pipe size for all piping systems is ¾". ½" piping will not be accepted.

1.4 REMOVALS/DEMOLITION

A. Equipment shall remain unless indicated for removal on the drawings; if in question do not remove until verified by Architect/Engineer.

B. Equipment indicated to be removed shall be offered to the owner prior to disposal. The equipment shall be relocated to the location designated by the owner when required. All removals include associated brackets, hangers and supports whether specifically mentioned or not.

C. If larger access openings are required to remove existing equipment, it is this contractor's responsibility to make access (cut) in the building and repair/replace (patch) access to match existing.

1.5 MATERIALS

A. Furnish all new equipment and materials as described herein. Any material, operation, method, or device mentioned, listed or noted within this specification shall be furnished and installed by the Mechanical Contractor, unless specifically mentioned as being furnished or installed by others.

B. When equipment other than design make manufacturer is used the Contractor accepts full responsibility for any or all dimensional, performance or electrical differences and associated changes.

1.6 STRUCTURAL SUPPORTS

A. Furnish and install all brackets, supports and/or reinforcements for installation of mechanical equipment in excess of building structure and applicable structural design where required or as shown on drawings, including equipment hung from steel joists (reinforce at panel points). Where detail is not shown, submit drawings of intended construction for approval.

B. In renovation projects where existing structural steel cross-bridging interferes with duct removal or new duct installation, the Mechanical Contractor is responsible for removal and re-installation. Notify the Architect/Engineer prior to removal for review and approval.

1.7 FIRE AND SMOKE STOPPING

A. Mechanical Contractor is responsible for fire and smoke stopping for all pipe and duct penetrations of fire and smoke rated partitions.

1.8 COORDINATION

A. Refer to Division 01 for coordination requirements.

B. Refer to reflected ceiling plans, structural drawings and all architectural plan and elevation drawings and coordinate all mechanical installations with ceiling patterns, lighting layouts, building structural members, etc. Coordinate the mechanical installations with the work of others engaged in the installation to preclude the possibility of interference with mechanical installations shown on the drawings.

C. Duct Smoke Detectors are furnished and wired by the Electrical Contractor, installed in the duct by the Mechanical Contractor.

D. Access doors required for access to mechanical equipment (volume dampers, smoke dampers, fire dampers, valves, etc.) through building walls, floors, ceilings, soffits, chases, etc. shall be provided by this contractor for installation by others, unless noted otherwise on the drawings. Coordinate locations.

E. When gas or fuel oil piping is provided for Mechanical Units by other contractors or trades, the final connection to the Mechanical Unit is the responsibility of the Mechanical Contractor. Coordinate locations.

F. It is the general intent that all electrical power wiring, motor starters and/or power disconnects be provided and installed by the Electrical Contractor. Some mechanical equipment is specified to have factory-installed integral starters and/or power disconnects and as such, are to be provided by the Mechanical Contractor.

G. Coordinate compatibility between the variable speed drive manufacturer and fan motors (prior to shop drawing submission) connected to VSD's for those applications. Mechanical Contractor is responsible for final systems performance and any changes required in the field.

H. Contractor is to coordinate piping and duct installation with devices installed under Division 26 including distribution panels, disconnects and starters in conformance with National Electric Code requirements for clear space around and over the devices.

1.9 SYSTEMS

A. The Mechanical Contractor shall be responsible to provide complete and operable systems, including operational properties to the extent necessary to link multiple components of a system together and to interface with other systems.

1.10 AIR FILTERS

A. The Mechanical Contractor shall clean all air units that utilize filters of all dust and debris before turning unit over to the owner. Replace all air filters after equipment start-up.

1.11 CODES, REGULATIONS AND STANDARDS

A. Materials furnished and installations made under this specification shall conform with applicable requirements of the codes, regulations and standards described herein, unless specifically described otherwise.

B. If any codes, standards, or regulations conflict, the most stringent shall apply.

C. All materials and equipment installations shall comply with standards of:

1. National Fire Protection Agency (NFPA).

2. Local Utilities.

3. Owner's Insurance Underwriters.

4. Applicable Government Agencies and Departments.

5. Underwriters Laboratory (UL).

6. Federal and State Occupational Safety and Health Act (OSHA).

7. Local Municipality.

8. Local Fire Department.

9. American Gas Association (AGA).

10. ANSI - American National Standards Institute.

11. ASTM Regulations and Standards for pipe, fittings, pressure vessels, testing and insulation.

12. Conformance with the applicable Codes, Rules, and Regulations of the State of New York, NYCRR, Code Rule 4 and Code Rule 14, pertaining to boilers, gas and oil burners, controls, and protective devices.

13. AWWA American Water Works Association.

14. New York State Energy Conservation Construction Code.

15. Electrically powered equipment shall comply with the National Electric Code (NEC) and shall be UL listed for the intended usage.

16. The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

17. New York State Education Department, Manual of Planning Standards.

1.12 MATERIALS FOR REVIEW

A. Consistent with the project schedule, the Mechanical Contractor shall submit for review the complete list including descriptive dimensions and rating data of equipment and materials.

B. All materials and equipment furnished shall be in accordance with manufacturer's catalog numbers listed herein.

C. Submittals for these materials shall be made as soon as practical for purpose of dimension verification and record.

D. The Mechanical Contractor shall submit the quantity of equipment catalog cuts or descriptive literature as required by Division 01.

E. For the items so listed, cuts or literature shall be clearly marked to indicate the following:

1. Function of the equipment to be furnished.

2. Picture of the unit.

3. Ratings, dimensions, and service clearances.

4. Arrangement to be furnished.

5. Electrical or other power characteristics.

6. Data sheets of accessories to be furnished.

7. Operating weight of each equipment unit.

8. Designation of item as shown on the drawings.

F. In addition, the submittal shall bear the project name, the contractor's name, the date reviewed by the contractor, the contractor's control number (if applicable), and a stamp with the contractor's signature certifying that the item has been reviewed and it complies with the requirements of the contract documents.

G. Any submittals not clearly marked as indicated above will be returned to the Mechanical Contractor for resubmission.

1.13 SUBSTITUTIONS

A. Submittal of substitute equipment performance data shall be made in strict adherence to the requirements set forth in Division 26.

1.14 EQUIPMENT SUPPLIER QUALIFICATIONS

A. Company specializing in manufacturing the products specified in this Division with minimum five years documented experience.

1.15 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Division 01.

B. Store and protect products under provisions of Division 01.

C. Protect units from physical damage by storing in protected areas and leaving factory covers in place.

1.16 SEQUENCING AND SCHEDULING

A. Sequence work under the provisions of Division 01.

B. Schedule work under the provisions of Division 01.

1.17 CLOSE OUT REQUIREMENTS

A. In addition to any or all requirements listed in Division 01 specifications, the following are required to be submitted to the Architect/Engineer:

B. Copy of all Valve Charts.

C. Letter attesting to the completion of owner instruction of water system chemical treatment procedure.

D. Letter attesting to the completion of all temperature control work.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 INSPECTIONS

A. The Mechanical Contractor shall have:

1. Required local or municipal inspection processed and presented to the Owner with certificate indicating approval of such governing bodies.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC DUCTWORK, PIPING, AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install hangers and supports complete with required appurtenances for HVAC ductwork, piping, and equipment. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. This section includes:

1. Hangers and supports for HVAC ductwork, piping, and equipment.
   a. Materials
   b. Components
   c. Attachments

C. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the hangers and supports for HVAC ductwork, piping, and equipment Work.

2. Notify other Contractors in advance of the installation of hangers and supports for HVAC ductwork, piping, and equipment to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before, the hangers and supports for HVAC ductwork, piping, and equipment Work.

1.2 REFERENCES

A. American National Standards Institute (ANSI).

1. ANSI B1.1 – Unified Inch Screw Threads (ASME B1.1).

B. American Society for Testing and Materials (ASTM).

1. ASTM A36/A36M – Standard Specification for Carbon Structural Steel.

2. ASTM A47/A47M – Standard Specification for Ferritic Malleable Iron Castings.

3. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

4. ASTM A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

5. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

6. ASTM A575 – Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.

7. ASTM A668/A688M – Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.

C. American Welding Society (AWS).

1. AWS B2.1 – Specification for Welding Procedure and Performance Qualification.

D. Manufacturers Standardization Society (MSS).

1. MSS SP 58 – Pipe Hangers and Supports-Materials, Design and Manufacture.

2. MSS SP 69 – Pipe Hangers and Supports - Selection and Application.

E. National Fire Protection Association (NFPA).

1. NFPA 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems.

F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

1. HVAC Duct Construction Standards – Metal and Flexible.

2. Seismic Restraint Manual: Guidelines for Mechanical Systems.

3. Thermoset FRP Duct Construction Manual.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
   a. Engage an experienced installer to perform the work of this Section who has specialized in installing hangers and supports for HVAC ductwork, piping, and equipment similar to that required for this Project and who is acceptable to manufacturer.

B. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single hangers and supports for HVAC ductwork, piping, and equipment manufacturer.

2. Require the hangers and supports for HVAC ductwork, piping, and equipment manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall equipment assembly by the hangers and supports for HVAC ductwork, piping, and equipment manufacturer.

C. Regulatory Requirements:

1. International Building Code (IBC).

2. National Fire Protection Association (NFPA).

3. Local and State Building Codes and Ordinances.

4. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Drawings showing fabrication methods, assembly, accessories, and installation details.
   b. Setting drawings, templates, and directions for the installation of anchor bolts and other anchorages.
   c. Drawings showing floor supported components and installation arrangement.

2. Product Data:
    a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all equipment.
    b. Complete component list.
    c. Detailed description of each component.
    d. Catalog cut sheets for each component.
    e. Deviations from Contract Documents. Any exceptions to the Contract Documents must be clearly defined. Contractor shall be responsible for any additional expenses that may occur due to any exception made.
    f. Other technical data related to specified material and equipment as requested by Engineer.

B. Informational Submittals: Submit the following:

1. Certificates:
    a. Independent certification reports.

2. Manufacturer Instructions:
    a. Instructions and recommendations for handling, storing, protecting the equipment.
    b. Installation Data.

3. Source Quality Control Submittals:
    a. Factory test reports.

4. Qualifications Statements:
    a. Manufacturer, when requested by Engineer.
    b. Installer, when requested by Engineer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

2. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of that Work.

3. Comply with manufacturer's recommendations for rigging of equipment.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design Criteria:

1. Designs generally accepted as exemplifying good engineering practice and using stock or production parts shall be utilized wherever possible.

2. Accurate weight balance calculations shall be made to determine the required force at each hanger and support location and the weight load at each force concentration point.

3. Hangers and supports shall be capable of supporting and restraining HVAC ductwork, piping, and equipment in all conditions of operation. They shall allow free expansion and contraction, and prevent excessive stress resulting from transferred weight being induced into the HVAC ductwork, piping, and equipment.

4. Hangers and supports shall be designed so that they cannot become disengaged by movements of the supported HVAC ductwork, piping, and equipment.

5. Rod length shall be limited to a maximum length of eight linear feet.

6. HVAC ductwork, piping, and equipment that cannot be hung by rod and hanger arrangement shall be floor or wall supported.

7. All structural components shall be designed based on static and dynamic loads imposed by the supported HVAC ductwork, piping, and equipment and shall include a safety factor of 2 for the yield strength. Minimum angle sizes shall be 2-inch x 2-inch x1/4-inch.

8. Load ratings, materials and installation shall be consistent with the recommendations from the latest edition of MSS SP 58, MSS SP 69, and FS WW-H-171.

2.2 MANUFACTURERS

A. Manufacturer: Provide product of one of the following:

1. Erico International Corporation.

2. Anvil International.

3. Or equal.

2.3 DETAILS OF CONSTRUCTION

A. Materials:

1. Hangers, supports, restraints, and appurtenances located in non-corrosive or dusty areas shall be hot dipped galvanized steel in accordance with ASTM A123/A123M and ASTM A153/A153M.

2. Hangers, supports, restraints, and appurtenances located outdoors shall be Type 316 stainless steel.

3. Steel used for the support of uninsulated copper piping or plastic piping shall be PVC coated.

B. Components of hangers and supports shall conform to the following:

1. Bolts: ASTM A307, Grade A, unless otherwise specified below.

2. Forgings: ASTM A668/A688M.

3. Malleable Iron: ASTM A47/A47M.

4. Rods and Bars: ASTM A575.

5. Threads: Unified Screw Threads, Class 2A and 2B, ANSI B1.1.

6. Structural Steel: ASTM A36/A36M.

C. Hanger Attachments: The following types of attachments shall be considered acceptable:

1. Adjustable Steel Clevis: FS WW-H-171E, Type 1.

2. Steel Double Bolt Pipe Clamp: FS WW-H-171E, Type 3.

3. Steel Pipe Clamp: FS WW-H-171E, Type 4.

4. Adjustable Swivel Pipe Ring: FS WW-H-171E, Type 6.

5. Adjustable Steel Band Hanger: FS WW-H-171E, Type 7.

6. Riser Clamp: FS WW-H-171E, Type 8.

7. Light-Duty Clevis Hanger: FS WW-H-171E, Type 12.

8. Long Clips: FS WW-H-171E, Type 26.

9. Offset J-Hooks: FS WW-H-171E, Type 27.

10. Steel Pipe Covering Protection Saddle: FS WW-H-171E, Type 40A.

11. Insulation Protection Shield: FS WW-H-171E, Type 41.

12. Pipe Saddle Support: FS WW-H-171E, Type 37.

13. Pipe Stanchion Saddle: FS WW-H-171E, Type 38.

14. Pipe Saddle Support with Base: FS WW-H-171E, Type 36.

15. Adjustable Roller Hanger: FS WW-H-171E, Type 42.

D. Structural Attachments: The following types of attachments shall be considered acceptable:

1. Side Beam Clamp: FS WW-H-171E, Type 20.

2. Center I-Beam Clamp: FS WW-H-171E, Type 21.

3. Welded Steel Bracket: FS WW-H-171E, Types 32 and 33.

4. Side Beam Bracket: FS WW-H-171E, Type 35.

E. Hanger Rod Attachments: Use as required to complete assembly:

1. Forged Steel Clevis: FS WW-H-171E, Type 14.

2. Adjustable Turnbuckle: FS WW-H-171E, Type 15.

3. Forged Steel Welders Eye Nut: FS WW-H-171E, Type 17.

F. Cable Hanging Systems (Gripple): Cable Hanging Systems with adjustable mechanical devices compliant with SMACNA HVAC Duct Construction Standards Third Edition-2005 shall consist of ready-to-use factory tested kit comprising of cable and cable end options. Crimps shall be Factory installed. All cable hanger products shall be certified as SMACNA and UL listed. All cable hangers shall have a minimum of 4:1 safety margin over the listed Safe Working Load (SWL).

2.4 SOURCE QUALITY CONTROL

A. Shop Tests:

1. Equipment shall be completely manufactured and pre-assembled in accordance with Reference Standards. Perform the following tests and inspections at factory before shipment:
   a. Tested and inspected for approval as a unit by Underwriters Laboratories Inc., UL Label or equal.
   b. Factory test equipment to ensure that the entire package has been properly fabricated and assembled, that the package meets the specified performance requirements including manufacturer's data report.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.2 PREPARATION

A. Surface Preparation:

1. Attachment to hollow core slabs or double tee slabs shall be provided in accordance with details shown on the structural drawings to prevent damage to pre-stressing strands.

3.3 INSTALLATION

A. General:

1. Install the equipment in accordance with the Contract Documents and by manufacturer's instructions and recommendations. Obtain written interpretation from Engineer in the event of conflict between manufacturer's instructions and recommendations and the Contract Documents.

2. Install in accordance with Laws and Regulations.

3. Do not modify structures to facilitate installation of equipment, unless approved in writing by Engineer.

4. Installation to conform to requirements of all local and state codes.

B. Ductwork:

1. The construction and installation of hangers and supports for ductwork shall conform to the recommendations given in the SMACNA HVAC Duct Construction Standards except as specified.

2. Hanger rods shall have threaded ends.

3. Secure upper hanger attachments to structural steel or steel bar joists wherever possible.

4. Do not attach hangers to steel decks.

5. Metallic fasteners installed with electrically operated or powder driven tools may be used as hanger attachments in accordance with the SMACNA HVAC Duct Construction Standards.

6. Attachment to Cast-in-Place Concrete:
   a. Secure hangers to overhead construction with expansion bolts.
   b. Secure hanger attachments required to be supported from wall or floor construction with single unit expansion bolts.

7. All ductwork shall be supported from trapeze type hangers. No sheet metal duct hangers or straps will be allowed. Gripple cable hanging systems shall be allowed as replacement for threaded rod for both upper and lower attachments when the expansion bolt fasteners used with the Gripple cable hangers are certified by ICC for use in cracked concrete. Cable Hangers (Gripple) may be used to suspend all the ductwork. Select hangers for the type of structure and suspension. All parts (including the cable) shall be supplied, warranted and proof tested by the manufacturer. Follow recommended factory installation guidelines, do not exceed working loads.

8. A pair of rods shall be provided at each duct support point.

C. Piping:

1. Provide all necessary pipe hanger material needed to safely and securely support or hang all piping. Pipe hanger loads shall be determined by accurate weight balance calculations to prevent transferring loads and forces to any equipment and terminal connections. Piping shall be supported at distances not exceeding the spacing specified in MC Table 305.4 or in accordance with ANSI/MSS SP-58.

2. Install building attachments at required locations within concrete or on structural steel for proper piping support. Install additional concentrated loads at valves, flanges, guides, strainers, expansion joints, and changes in direction of piping. Install concrete inserts before concrete is poured; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts. For composite metal decks, inserts shall be of the type that is supported entirely by the concrete slab, not by the metal deck. Expansion bolts shall be installed so that the load acts on the bolts in shear and withdrawal. Expansion bolts shall be carefully located in order to eliminate the risk of damage to concrete, steel reinforcement, electrical conduits and any other embedded items.

3. Install hangers, supports, clamps and attachments to support piping properly from building structure. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

4. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and all other items and accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

5. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated or by other recognized industry methods.

6. Provisions for Movement
    a. Install hangers and supports to allow controlled movement of piping systems, to permit freedom of movement between pipe anchors and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
    b. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
    c. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so that maximum pipe deflections allowed by ANSI B31 Pressure Piping Codes are not exceeded.

7. Pipe Supports
    a. Mains located near floors shall be supported on roller type pipe stands bedded in cement base. When mains are installed before concrete floor is laid, the mains shall be supported from overhead construction until the pipe stands can be put in place.

b. Horizontal piping connections (near floor) to convectors and all other items and accessories located more than 4' from risers shall be supported on adjustable iron pipe stands. Pipe stand shall consist of a split ring extension hanger mounted on a hanger flange, which shall be secured to the floor.

8. Insulated Piping: Comply with the following installation requirements.
   a. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
   b. Shields: Where low-compressive-strength insulation or vapor barriers are indicated on chilled/dual temperature water piping, install coated protective shields. For pipe 8" and over, install wood insulation saddles.
   c. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.

   d. Insulation Saddle System, the equal of Anvil Fig 260 ISS can be used instead of shields and/or saddles when proper insulating techniques are employed including the use of mastic and caulk on all insulation edges and final taping. Position the pipe on the saddle, notch section of the insulation to fit around the saddle, square cut the adjoining insulation section and butt the mating end to the notched section, finish taping according to standard methods, no metal shield is required between the hanger and pipe insulation.

9. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31 and to prevent transfer of loading and stresses to connected equipment.

10. Fabricate and install anchor by welding steel shapes plates and bars to piping and to structure. Comply with AWS standards.

11. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions and to limit movement of piping and forces to maximum recommended by manufacturer for each unit.

12. Anchor Spacings: where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

13. Piping passing under concrete areas shall be supported by hangers secured by means of beam clamps fastened to the beams. Where pipe support spacing is excessive between steel, beam clamps shall be fastened to structural members that are approved by the Engineer of Record. Removed fireproofing around beams shall be replaced to original condition. No hangers or supports shall be attached to hung ceilings, concrete, ductwork or work of other trades.

D. Anchorages and Base Plates:

1. Provide anchorages in new or existing concrete, as applicable, in accordance with equipment manufacturer's recommendations and the Contract Documents.

3.4 ADJUSTING

A. Adjust all equipment for proper settings.

3.5 CLEANING

A. Thoroughly clean all equipment and accessories prior to installation.

B. Remove all dirt, rust, dust, etc. from equipment and accessories after installation.

C. Remove and dispose of all debris and waste from the Site resulting from installation.

3.6 SCHEDULES

A. Hangers and Supports for Ductwork:

1. Spacing:
   a. Ductwork shall be supported at distances not exceeding the spacing specified below:
      1) Metal Ductwork:
         a) Maximum Spacing: 10 feet.
      2) Flexible and Other Factory-Made Ductwork:
         a) Maximum Spacing: In accordance with the manufacturer's installation instructions.

2. Hanger Rod Sizes:
   a. Hanger rods shall be sized based on static and dynamic loads imposed by the supported ductwork and shall include a safety factor of 2 for the yield strength.
   b. Rod load shall not exceed rod manufacturer's recommended capacity.

B. Hangers and Supports for Piping:

1. Spacing:
   a. Piping shall be supported at distances not exceeding the spacing specified below or in accordance with MC Table 305.4 or in accordance with ANSI/MSS SP-58:
      1) Copper Tube:
         a) Maximum Horizontal Spacing: 6 feet.

b) Maximum Vertical Spacing: 10 feet.

2) Copper Pipe:
   a) Maximum Horizontal Spacing: 12 feet.
   b) Maximum Vertical Spacing: 10 feet.

3) Steel Pipe:
   a) Maximum Horizontal Spacing: 12 feet.
   b) Maximum Vertical Spacing: 15 feet.

2. Hanger Rod Sizes:
   a. Hanger rods shall be sized based on static and dynamic loads imposed by the supported piping and shall include a safety factor of 2 for the yield strength.
   b. Rod load shall not exceed rod manufacturer's recommended capacity.

C. Hangers and Supports for HVAC Equipment:

1. Provide spacing and hanger rod sizes in accordance with equipment manufacturer's installation instructions.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment, and incidentals as shown, specified and required to furnish identification nameplates, tags, pipe markers and labels for identification of HVAC piping ductwork and equipment in the scope of work. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. This section includes:

1. Nameplates.

2. Tags.

3. Pipe markers.

4. Plastic labels.

1.2 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product data: Copies of manufacturer's technical data, including catalog information and specifications, for each product specified.

1.3 SUPPLEMENTAL QUALITY ASSURANCE

A. Codes and Standards

1. Per Section MC 301.3, Identification, each length of pipe and tubing and each pipe fitting utilized in a mechanical system shall bear the identification of the manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS AND MANUFACTURERS

A. Provide manufacturer's standard products of categories and types required for each application as referenced in other Division 23 Sections, shown on the Drawings and/or Schedules. Where more than single type is specified for application, provide single selection for each product category.

B. Indoor/Outdoor Self-Adhesive Vinyl Markers

1. Self-sticking high gloss flexible vinyl pipe markers shall meet the requirements of ASME/ANSI A13.1 standard for identifying piping system contents. Tape shall have directional flow arrows.

2. Makers shall be 0.004” thick durable vinyl material for indoor and outdoor environments with weather resistance ink.

3. Acrylic adhesive shall have a 15-minute dwell time to stainless steel, polypropylene and powder coated metal with ultimate dwell time of 72 hours.

4. Minimum application temperature shall be 0ºF with a service temperature range of -40ºF to 180ºF.

C. Pipe Identification Schedule - Color Coding

1. All color schemes, minimum length of marker color field and minimum letter height shall be in accordance with ANSI/ASME Standard A13.1-2015, “Scheme for the Identification of Piping Systems”.

D. Self-Adhesive Duct Markers

1. Color-coded duct markers. Conform to the following color code:
   a. Green: Cold air.
   b. Yellow: Hot air.
   c. Yellow/Green: Supply air.
   d. Blue: Exhaust, outside, return, and mixed air.

2. Nomenclature: Include the following:
   a. Direction of air flow
   b. Duct service (supply, return, exhaust)
   c. Duct origin (from)
   d. Duct destination (to)

E. Valve Tags

1. Brass Valve Tags: 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener.
   a. Provide 2" sq tags.

b. Numbers and letters shall be block type, indented and filled with durable black compound.

2. Valve Tag Fasteners: solid brass chain (wire link or beaded type), or solid brass S-hooks of the size required for proper attachment of tags to valves, and manufactured specifically for that purpose.

F. Equipment Nameplates

1. Provide equipment engraved nameplate marker with adhesive backing for each equipment item furnished under the Contract, and for other equipment items indicated to receive nameplates. Equipment nameplates specified in this Article are in addition to equipment manufacturer's standard nameplate with manufacturer name, model number, serial number, and similar information.

2. Color-coded equipment markers. Conform to the following color code:
   a. Green: Cooling equipment and components.
   b. Yellow: Heating equipment and components.
   c. Yellow/Green: Combination cooling and heating equipment and components.
   d. Blue: Equipment and components that do not meet any of the above criteria.

3. Nomenclature: Include matching terminology on schedules and Drawings as closely as possible.

4. Equipment nameplates shall have text as large as possible to fit on nameplate; text shall be not less than 1/2-inch high. All text on a given nameplate shall be one size.

G. Plastic Labels

1. Printed labels created with label printer/maker similar to Brother P-Touch for marking:
   a. White iron of ceiling grid for equipment and access concealed by the hung ceiling. Labels shall be 1/2" high black letters on clear background.
   b. Access Doors: Provide plastic labels on each access door indicating purpose of access (to what equipment) and other maintenance and operating instructions, and appropriate safety and procedural information. Labels shall be 1/2" high black letters on clear background.

H. Key Identification Tag: Provide identification tag on every key provided as part of the maintenance materials specified in their respective sections. Tags shall be plastic stamped or engraved with 1/4" high letter for abbreviated name of unit and/or equipment and 1/2" for the number and with 5/32" hole for fastener. The tag shall be of the same color as the equipment with black lettering. Provide 2" square or round tags. Tag Fasteners: solid brass chain (wire link or beaded type), or solid brass S-hooks of the size required for proper attachment of tags to valves, and manufactured specifically for that purpose.

I. Lettering and Graphics

1. Coordinate names, abbreviations and other designations used in the identification work with corresponding designations shown on the Drawings or Schedules, or specified. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of systems and equipment.

J. Approved Manufacturers

1. Brady (W.H.) Co.; Signmark Div.

2. Industrial Safety Supply Co., Inc.

3. Seton Name Plate Corp.

4. Brimar Industries, Inc.

5. Marking Services Inc.

6. EMED Co., Inc.

7. Graphic Products Inc.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordination: Where identification is to be applied to surfaces that require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

B. Ductwork Identification

1. Identify air supply, return, exhaust and intake ductwork with duct self-adhesive tape markers and provide arrows showing ductwork service and direction of flow, in black or white (whichever provides most contrast with ductwork color).

2. Location: In each space where ductwork is exposed, or concealed only by removable ceiling system, locate signs near points where ductwork originates or continues into concealed enclosures (shaft, underground or similar concealment), and at 50' spacings along exposed runs.

C. Piping System Identification: Install pipe markers and color bands and include arrows to show direction wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

1. Near each valve and control device

2. Near each branch, excluding short take-offs for terminal units; mark each pipe at branch, where there could be question of flow pattern.

3. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.

4. Near major equipment items and other points of origination and termination.

5. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.

6. On piping above removable acoustical ceilings except omit intermediately spaced markers.

D. Valve Identification: Provide valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, and shut-off valves at HVAC terminal devices and similar rough-in connections of units. List each tagged valve in valve schedule for each piping system.

E. Mechanical Equipment Identification: Provide:

1. A permanent factory-applied name-plate(s) shall be affixed to appliances (reference Section MC 301.3) on which shall appear in legible lettering, the manufacturer’s name or trademark, the model number, serial number and the seal or mark of the approved agency.

2. Equipment engraved nameplate marker with adhesive backing for each equipment item furnished under the Contract, and for other equipment items indicated to receive nameplates. Equipment nameplates specified in this Article are in addition to equipment manufacturer’s standard nameplate with manufacturer name, model number, serial number, and similar information.

3. Install self-adhesive tape equipment marker near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device in their respective sections.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified, and required to perform the testing, adjusting, and balancing for HVAC as specified herein.

2. This section specifies the requirements for the testing, adjusting and balancing of air and hydronic fluid distribution systems, including the equipment and devices associated with each system to produce the design objectives.

3. Pre-test existing equipment removed prior to demolition and existing equipment to remain that are part of systems to be demolished with the purpose of documenting the existing HVAC system's baseline performance and any issues or deficiencies, ensuring equipment new / existing being installed or re-installed will produce the design objectives.

4. The Work shall include checking installations for conformity to design, setting final flow and fan speed, adjusting equipment and devices, recording data, preparing and submitting final balancing reports, and recommending modifications to the mechanical installations.

5. Retain the services of an independent testing, adjusting, and balancing firm meeting the qualifications specified to be the single source of responsibility to test, adjust, and perform a final balance of the building mechanical systems specified and identified in this Project.

6. Contractor shall have the balancing specialist review all the work with the respective manufacturers of the equipment and devices involved and shall coordinate all the Work. The balancing specialist shall examine the Drawings and Specifications to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper adjusting and balancing of systems and equipment.

7. Provide balancing dampers, pressure taps, gauges, valves, and any other items and components as required for a properly balanced system, whether or not specified herein or shown on the Drawings, all at no additional cost to the Owner. Adjustment or replacement of parts recommended by the balancing specialist shall be made in strict accordance with the respective manufacturer's recommendations.

8. Temperature Control Contractor shall set the adjustment of the automatically operated dampers, control valves and all the other items and accessories to operate as required by the balancing contractor.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the testing, adjusting, and balancing for HVAC Work.

2. Notify other Contractors in advance of the testing, adjusting, and balancing for HVAC to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before, the testing, adjusting, and balancing for HVAC Work.

3. BC Cate Elementary: Sequence of System Interdisciplinary/Functional Performance Tests, Balancing and Operational Tests shall be as follows:
   a. Contractor shall start up all systems and do an initial (rough) balance.
   b. After the ATC Contractor’s successful testing of the BMS the Contractor shall Commission/Demonstrate to the Commissioning Authority all equipment controls and verify that the sequence of operations as defined in Section 23 09 23 - Direct-Digital Control System For HVAC, is achieved. The Interdisciplinary/Functional Performance Test forms for correctly functioning systems will be signed by the Commissioning Authority.
   c. Following successful completion of Steps “a” and “b”, the Contractor shall perform a Final Balance as defined herein.

C. Related Sections:

1. Section 23 09 23, Direct-Digital Control System For HVAC.

1.2 REFERENCES

A. Associated Air Balance Council (AABC).

1. AABC National Standards for Total System Balance.

B. American National Standards Institute/American Industrial Hygiene Association (ANSI/AIHA).

1. ANSI/AIHA Z9.5 – Laboratory Ventilation.

C. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

1. ASHRAE Handbook – Fundamentals.

D. National Environmental Balancing Bureau (NEBB).

1. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.

E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

1. SMACNA HVAC Systems – Testing, Adjusting & Balancing Handbook.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Balancer:
   a. Engage an experienced balancer to perform the work of this Section who has specialized in testing, adjusting, and balancing for HVAC systems similar to that required for this Project.
   b. Minimum of five years of experience in testing, adjusting, and balancing substantially similar equipment and able to show evidence of at least five installations in satisfactory operation for at least five years in the continental United States.
   c. Submit name and qualifications to Engineer along with the following information on a minimum of five successful projects:
      1) Names and telephone numbers of owners, architects or engineers responsible for projects.
      2) Approximate contract cost of the testing, adjusting, and balancing for HVAC Work.
      3) Amount of area tested, adjusted, and balanced.
      4) Biographical information on employee proposed to directly supervise the testing, adjusting, and balancing Work.

B. Regulatory Requirements:

1. Associated Air Balance Council (AABC).

2. National Electrical Code (NEC).

3. National Environmental Balancing Bureau (NEBB).

4. National Fire Protection Association (NFPA).

5. Underwriters Laboratories Inc. (UL).

6. New York State Construction Codes.

7. Local Codes and Ordinances.

8. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:
   a. Data sheets with name of devices, manufacturer's name, model number, latest date of calibration, and correction factors for each testing, adjusting, and balancing instruments.
   b. Other technical data related to specified material and equipment as requested by Engineer.

B. Informational Submittals: Submit the following:

1. Certificates:
   a. Certification by National Environmental Balancing Bureau (NEBB), Association Air Balance Council (AABC), or equal.

2. Source Quality Control Submittals:
   a. Specimen copies of report forms for Engineer's review and approval.
      1) Forms shall be 8-1/2 by 11-inch paper for loose-leaf binding, with blanks for certification of report and listing all required testing, adjusting, and balancing requirements and ratings.

3. Field Quality Control Submittals:
   a. Written startup and field test reports presenting results of required field testing, adjusting, and balancing.
      1) Certified reports shall be in typed format on approved forms imprinted with the company's name.
      2) Reports shall include procedure outline used to test, adjust, and balance the systems and the types of instruments used.
      3) Minimum three certified copies of testing, adjusting, and balancing reports to the Engineer for review.
      4) Reports must be submitted to Engineer and Owner for approval prior to Owner's acceptance for responsibility.

4. Qualifications Statements:
   a. Balancer, when requested by Engineer.

1.5 SITE CONDITIONS

A. Environmental Requirements:

1. Testing, adjusting, and balancing for HVAC shall be performed when outside ambient conditions are approximate to the design heating and cooling criteria indicated in drawings for all heating and cooling functions.

PART 2 - PRODUCTS

2.1 EQUIPMENT PERFORMANCE

A. Equipment Description:

1. Air Balance Instruments:
   a. Provide all velometers, anemometers, pitot tubes, differential air pressure gages, manometers, hook gages, static pressure probe units, and all other instruments and accessories as required to perform all air balance tests of HVAC equipment, ducts, registers, grilles, etc.
   b. Flow-measuring hoods (manufactured, not fabricated) shall be acceptable for measurement of ceiling diffuser performance only.

2. Hydronic Balance Instruments:
   a. Provide manometers, pressure gages, and all other instruments and accessories as required to perform all hydronic balance tests of HVAC equipment, piping, etc.

3. System Performance Measuring Instruments:
   a. Provide insertion thermometers, sling psychrometers, tachometers, revolution counters, clamp-on volt-ammeter recorders, and other instruments as required to measure all facets of the complete HVAC system performance.

B. Performance Criteria:

1. Instrumentation shall be in accordance with NEBB, AABC, or SMACNA requirements and shall be calibrated to the accuracy standards demanded by these organizations.

2.2 ACCESSORIES

A. Balancing Sheaves and Belts:

1. Balancing sheaves and belts shall be provided for all belt driven equipment.

2. Sheaves and belts shall be provided to match construction and duty provided by the equipment manufacturer.

3. Equipment sheaves and belts replaced or not required to achieve balancing shall be submitted to the Owner as spare parts.

PART 3 - EXECUTION

3.1 INSPECTION

A. Heating, ventilating and air conditioning equipment and components shall be completely installed and in continuous operation, as required, to accomplish the testing, adjusting and balancing Work specified.

B. Inspect all HVAC equipment and components for proper operation prior to testing, adjusting and balancing.

1. Fan Belt Deflection: Not less than 1/4-inch or more than 1/2-inch.

C. Pre-Startup Inspection:

1. Verify proper equipment mounting and setting.

2. Verify that control, interlock and power wiring is complete.

3. Verify alignment of motors and drives.

4. Verify proper piping connections and accessories.

5. Verify that lubrication is completed.

D. First Run Observations:

1. Verify direction of rotation.

2. Verify setting of safety controls.

3. Monitor heat build-up in bearings.

4. Check motor loads against nameplate data.

E. Equipment Check:

1. Verify proper overload heater sizes.

2. Verify function of safety and operating controls.

3. Verify proper operation of equipment.

4. Report on inspection, observation and checking procedures.

F. Promptly report defects which may affect the Work to Engineer.

G. Should corrective measures caused by faulty installation require re-testing, adjusting and balancing, such Work shall be at no additional cost to the Owner.

3.2 APPLICATION

A. General:

1. Test, adjust, and balance all systems, ductwork, piping, etc. and their control systems in accordance with the AABC National Standards for Total System Balance, NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems, SMACNA HVAC Systems - Testing, Adjusting & Balancing Handbook, or in compliance with the standard procedure manual published by the testing, adjusting, and balancing organization affiliated with Contractor. Contractor shall submit one copy of the standard procedure manual to the Engineer for their records.

2. Contractor shall provide all necessary instruments, tools, ladders, etc. to complete all testing, adjusting, and balancing Work.

3. Contractor shall assume full responsibility for safe keeping of all instruments, tools, ladders, etc. during the course of the Work.

4. Contractor shall be solely responsible for the protection and safeguarding of the Work and shall provide every protection against accidents, injury, and damage to persons and property.

5. Contractor shall keep dust, dirt, and debris to an absolute minimum and reinstall all removed ceiling components to their original positions at the end of each day's Work.

6. Contractor shall be fully responsible for removal and reinstallation of ceiling system and replacement of any component damaged.

7. Contractor shall install additional access panels at no extra cost to the Owner, as is required to gain access to equipment concealed above ceilings, behind walls, or any other concealed space.

8. Systems shall be tested, adjusted, and balanced with clean filters and strainers.

9. Where equipment is provided with a variable speed controller (VSC) or variable frequency drive (VFD), balance the equipment first with the VSC or VFD and then with balancing dampers (air systems) or valves (hydronic systems). All systems shall be optimized through the VSC or VFD by balancing with the minimum static pressure needed to meet design flow conditions.

B. Air Systems:

1. Preliminary:
   a. Identify and list size, type and manufacturer of all equipment to be tested, including air terminals.

2. Central Systems:
   a. Test rpm for all equipment, including adjusting of each fan, air handling unit, and air conditioning unit to design requirements within the limits of mechanical equipment provided.
   b. Test and record motor voltages and running amperes including motor nameplate data, and starter heater ratings for each unit as listed above.
   c. Make pitot tube traverse of main supply, exhaust and return ducts, determine airflow at all fans and units and adjust fans and units to within five percent of design requirements.
   d. Test and record system static pressure, suction and discharge.
   e. Test and adjust system for design outside air, (cfm).
   f. Test and adjust system for design recirculated air, (cfm).
   g. Test and record heating apparatus entering air temperatures, (dry bulb).
   h. Test and record cooling apparatus entering air temperatures, (dry bulb and wet bulb).
   i. Test and record heating apparatus leaving air temperatures, (dry bulb).
   j. Test and record cooling apparatus leaving air temperatures, (dry bulb and wet bulb).
   k. Record all fan and air handling unit speeds.
   l. Record air quantity delivered by each fan and air-handling unit.

3. Distribution:
   a. Sheave and belt replacement shall be provided as the first means of accomplishing the balancing Work before volume dampers are adjusted from their initial open positions.
   b. Adjust volume dampers, control dampers, splitter dampers, etc., to proper design airflow in main ducts, branch ducts, and zones.

4. Air Terminals:
   a. Identify each air terminal as to location and determine required flow reading.
   b. Test and adjust each air terminal to within tolerance of design requirements as listed below.
      1) Positive Zones:
         a) Diffusers and Supply Air Terminals: 0 percent to +10 percent.
         b) Exhaust and Return Air Terminals: 0 percent to -10 percent.

2) Negative Zones:
   a) Diffusers and Supply Air Terminals: 0 percent to -10 percent.
   b) Exhaust and Return Air Terminals: 0 percent to +10 percent.
3) Neutral Zones:
   a) All Air Terminals: -10 percent to +10 percent.

c. Test procedure on air terminals shall include recording comparison of required airflow and observed airflow, adjustment of terminal, and recording of final airflow.
d. Adjust flow patterns from air terminal units to minimize drafts to the extent that the design and equipment permits.

5. Verification:
   a. Prepare summation of readings of observed airflow for each system, compare with required airflow, and verify that duct losses are within specified allowable range.
   b. Verify design airflow at fans as described above.
   c. If determined that the air system has not been properly balanced, Contractor shall rebalance and recheck all equipment and components in the presence of the Engineer and as accepted by the Engineer.

C. Hydronic Systems:

1. Preliminary:
   a. List all mechanical specifications of tested equipment and verify against the Contract Documents.
   b. Open all valves in all lines to full open position.
   c. For each pump, verify rotation, test and record pump shut-off head, and test and record pump wide-open head.
   d. Verify proper water level in the system.
   e. Verify that air vents at high points of water systems are installed and operating freely.

2. Central Equipment:
   a. Set pumps to provide proper flow quantity.
   b. Observe leaving water temperatures and return water temperatures. Reset to correct design temperatures.
   c. Record pump operating suction and discharge pressures, pump manufacturer, model number, nameplate horsepower, rpm. Determine final dynamic head and indicate flow rate (gpm) plotted on the proper curve for pump.

3. Distribution:
   a. Adjust balance valves, control valves, etc., to proper design flow rates (gpm) in main piping, branch piping, and terminal units.

4. Terminal Units:
   a. Upon completion of flow readings and adjustments at equipment and coils, mark all settings and record following data:
      1) Area that item of equipment serves.
      2) Equipment number corresponding to that as shown.

3) Manufacturer and model number.
4) Inlet water temperatures.
5) Outlet water temperatures.

b. Observe and record pressure drop through units at set flow rate on call for full heating or cooling.
c. Record calculated flow rates and design flow rates through each piece of equipment.

5. Flow Balancing Devices:
   a. Upon completion of adjustments mark all settings and record the following for each device:
      1) Upstream and downstream pressure.
      2) Fluid temperature.
      3) Specified fluid temperature.
      4) Calculated or measured flow rate.
   b. If determined that the hydronic system has not been properly balanced, Contractor shall rebalance and recheck all equipment and components in the presence of the Engineer and as accepted by the Engineer.

D. Automatic Temperature Control System:

1. In cooperation with Section 23 09 23, Direct-Digital Control System For HVAC, and the control manufacturer's representative, set and adjust automatically operated devices to achieve required sequence of operations.

2. Testing organization shall verify all controls for proper calibration and list those controls requiring adjustment by control system installer.

3.3 SCHEDULES

A. Test, adjust, and balance the air terminal devices, ductwork, hydronic distribution and terminal devices and their control systems associated with the following HVAC equipment:

1. Refer to HVAC Equipment Schedules.

END OF SECTION

SECTION 23 07 13

DUCT INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install duct insulation complete with accessories. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

2. This Work also includes:
   a. Repairing all existing duct insulation in all areas that is damaged or displaced due to new construction by Contractor with materials and procedures identical to the existing duct insulation.

B. Coordination:

1. Duct insulation shall not be installed until ductwork has been field tested and approved by Engineer.

2. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the duct insulation Work.

3. Notify other Contractors in advance of the installation of duct insulation to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before, the duct insulation Work.

C. Related Sections:

1. Section 23 31 00, HVAC Ducts and Casings.

2. Section 23 05 53, Identification for HVAC Piping and Equipment.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM C411 – Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

B. National Fire Protection Association (NFPA).

1. NFPA 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems.

2. NFPA 90B – Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

3. NFPA 255 – Standard Method of Test of Surface Burning Characteristics of Building Materials.

C. Underwriters Laboratories Inc. (UL).

1. UL 181 – Factory-Made Air Ducts and Air Connectors.

2. UL 723 – Test for Surface Burning Characteristics of Building Materials.

1.3 DEFINITIONS

A. Concealed spaces – spaces in which ductwork are installed and are withdrawn or removed from observation or kept from plain sight. Spaces above hung ceiling are examples of concealed spaces.

B. Exposed spaces – spaces in which ductwork are installed and laid open to view; unconcealed. All outdoor locations shall be considered exposed spaces.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:
   a. Minimum of five years of experience producing substantially similar material and able to show evidence of at least five installations in satisfactory operation for at least five years in the continental United States.

2. Installer:
   a. Engage an experienced installer to perform the work of this Section who has specialized in installing duct insulation similar to that required for this Project and who is acceptable to manufacturer.

B. Regulatory Requirements:

1. National Fire Protection Association (NFPA).

2. Underwriters Laboratories Inc. (UL).

3. Local and State Building Codes and Ordinances.

4. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Drawings showing fabrication methods, assembly, accessories, and installation details.

2. Product Data - General:
   a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all material.
   b. Deviations from Contract Documents. Any exceptions to the Contract Documents must be clearly defined. Contractor shall be responsible for any additional expenses that may occur due to any exception made.
   c. Other technical data related to specified material and equipment as requested by Engineer.

3. Product Data – Insulation:
   a. Submit schedule showing manufacturer's product number, k-value, thickness and furnished accessories for each duct system requiring insulation.

B. Informational Submittals: Submit the following:

1. Certificates:
   a. Independent certification reports:
      1) UL Label.

2. Manufacturer Instructions:
   a. Instructions and recommendations for handling, storing, protecting the material.
   b. Installation Data.

3. Source Quality Control Submittals:
   a. Factory test reports.

4. Qualifications Statements:
   a. Manufacturer, when requested by Engineer.
   b. Installer, when requested by Engineer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all material in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to material or components. Replace lost material or components and repair damage to new condition, in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design Criteria:

1. All insulation systems including covering, mastics, adhesives, sealers and facings shall have the following Fire Hazard Classifications in accordance with ASTM E84 or UL 723:
   a. Flame Spread Index: 25 maximum.
   b. Smoke Developed Index: 50 maximum.

2. All insulation systems shall not flame, glow, smolder or smoke when tested in accordance ASTM C411 at service temperature of 250 degrees F.

3. All insulation systems shall meet fire safety standards NFPA 90A, 90B, and 255 where applicable.

B. Performance Criteria:

1. Acoustical thermal insulation used as internal insulation and exposed to the airstream in ducts shall be shown to be durable when tested in accordance with UL 181.

2.2 MANUFACTURERS

A. Manufacturer: Provide product of one of the following:

1. CertainTeed.
2. Johns Manville.
3. Owens Corning.
4. Or equal.

2.3 DETAILS OF MATERIALS

A. Flexible Thermal Insulation:

1. Type: Flexible fiberglass blanket with vapor barrier facing.
2. Density: Minimum one pound per cubic foot.
3. Facing: Foil-Scrim-Kraft (FSK).
4. Thermal Conductivity: Maximum 0.27 Btu-in/hr-ft^2-degree F at 75 degrees F mean temperature.
5. Water Vapor Transmission: Maximum 0.05 perm.

B. Rigid Thermal Insulation:

1. Type: Rigid fiberglass board with vapor barrier facing.
2. Density: Minimum three pound per cubic foot.
3. Facing: Foil-Scrim-Kraft (FSK).
4. Maximum Thermal Conductivity: 0.23 Btu-in/hr-ft^2-degree F at 75 degrees F mean temperature.
5. Water Vapor Transmission: Maximum 0.05 perm.

C. Acoustical Thermal Insulation:

1. Type: Rigid fiberglass duct liner board with black mat surface and antimicrobial coating.
2. Density: Minimum three pound per cubic foot.
3. Thermal Conductivity: Maximum 0.23 Btu-in/hr-ft^2-degree F at 75 degrees F mean temperature.

2.4 ACCESSORIES

A. Provide staples, bands, wires, tape, anchors, corner angles and all other items and accessories recommended by insulation manufacturer for applications indicated.

B. Ductwork Insulation Compounds: Provide cements, adhesives, coatings, sealers, protective finishes and all other items and compounds recommended by insulation manufacturer for applications indicated.

2.5 IDENTIFICATION

A. All external duct insulation shall be legibly printed or identified at intervals not greater than 36 inches with the name of the manufacturer, the thermal resistance R-value at the specified thickness and the flame spread and smoke-developed indexes of the composite materials.

B. All duct insulation identification shall be provided in accordance with Section 23 05 53, Identification for HVAC Piping and Equipment.

2.6 SOURCE QUALITY CONTROL

A. Shop Tests:

1. Material shall be completely manufactured and pre-assembled in accordance with Reference Standards. Perform the following tests and inspections at factory before shipment:
   a. Tested and inspected for approval as a unit by Underwriters Laboratories Inc., UL Label.
   b. Factory test material to ensure that the entire package has been properly fabricated and assembled, and that the package meets the specified performance requirements including manufacturer's data report.
   c. Flame Spread.
   d. Smoke Developed.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. All ductwork leaks shall be repaired prior to installation of duct insulation.

C. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.2 INSTALLATION

A. General:

1. Install the material in accordance with the Contract Documents and by manufacturer's instructions and recommendations. Obtain written interpretation from Engineer in the event of conflict between manufacturer's instructions and recommendations and the Contract Documents.

2. Install in accordance with Laws and Regulations.

3. Do not modify structures to facilitate installation of material, unless approved in writing by Engineer.

4. Installation to conform to requirements of all local and state codes.

B. Duct insulation shall be continuous through walls and floor openings except where walls or floors are required to be firestopped or required to have a fire resisting rating.

C. Install insulation so as to make surfaces smooth, even, substantially flush with adjacent insulation and installed in a manner to maintain the integrity of the vapor barrier.

D. Fiberglass board shall be used to insulate ductwork that is exposed in fan or equipment rooms or is outdoors.

E. Flexible type duct insulation shall be used to insulate ductwork that is installed in concealed spaces (hung ceilings, furred spaces, pipe and duct spaces, crawl spaces and tunnels).

F. Facing and Finishing

1. Exposed Ducts: Insulation on ductwork exposed to view shall have facing or finish as specified herein: Facing or finish shall be reinforced with metal corner beads and shall have a glass cloth finish installed in the following manner: Brush a full coat of lagging adhesive/vapor retardant coating on all surfaces of the ductwork insulation. Imbed glass cloth in the wet coating, smoothing to avoid wrinkles. Overlap cloth seams 4", locating seams so as to be hidden from view, wherever practicable. Apply a second coat of lagging adhesive.

2. Concealed Ducts: Insulation on warm air ductwork installed within pipe and duct spaces, storerooms, hung ceilings, furred spaces, or pipe tunnels shall have no additional finishing, other than the foil- reinforced-kraft facing. All cold air ductwork for the above spaces shall be provided with two coats of a vapor retardant coating at least 1/16” thick with a layer of glass cloth in between or self-adhesive vapor barrier jacket.

G. Installation of Board Type Insulation

1. Insulation shall be applied with edges tightly butted. It shall be impaled on pins welded to the duct and secured with speed clips impaled over the pins. Pins shall be cut off close to speed clips. On horizontal ducts, pins shall be spaced not less than one per square foot for the bottom surface, and not less than one per two square feet on the sides and top surface. On vertical ducts, the pins shall be spaced not less than one clip per two square feet of duct surface. For faced insulation cold air ductwork, point all joints and cracks with vapor barrier coating, and seal all joints and speed clips with a 3" wide strip of foil-reinforced-kraft facing adhered with vapor barrier/insulation adhesive. The use of pressure sensitive tape of the same facing material also is acceptable for this purpose. For cold air ductwork, the laminated self-adhesive vapor barrier jacket will be accepted.

2. Where the welded pin method cannot be used because of space or size restriction, the use of stick clips will be approved, and the insulation shall be additionally secured to the duct with insulation adhesive. The adhesive shall cover the entire surface of the sheet metal when applied to underside of horizontal duct, but may be applied in strips for application to top and sides with a minimum of 50% coverage. Insulation shall be additionally secured with No. 16 gage soft annealed or galvanized steel wire on not more than 12" centers. Continuous metal, corner angles shall be used to protect edges of the insulation.

H. Installation of Flexible Type Insulation:

1. Flexible type insulation shall be cut slightly longer than the perimeter of the duct to insure full thickness at corners. Insulation shall be applied with edges tightly butted, and seams stapled approximately 6" on centers with outward clinching staples. Insulation shall be additionally secured with No. 16 gage soft annealed or galvanized steel wire on not more than 12-inch centers. When the width of a horizontal duct is 24" or more, the insulation shall also be fastened with welded pins or stick clips spaced on 18-inch centers on the bottom surface of the duct. All joints and clips shall be taped and sealed with 3" wide strips of foil-reinforced-kraft facing applied with insulation adhesive. The use of pressure sensitive tape of the same facing material also is acceptable for this purpose. For cold air ductwork, vapor barrier coating or laminated self-adhesive vapor barrier jacket will be accepted.

I. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

J. Maintain integrity of vapor-barrier on ductwork insulation and protect it to prevent puncture and other damage.

K. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except where otherwise indicated such as rated penetrations.

3.3 EXISTING INSULATION REPAIR

A. Repair damaged or removed sections of existing duct insulation, both previously damaged/removed and damaged/removed during construction. Use insulation of same type and thickness as existing insulation, install new jacket lapping and sealed over existing.

3.4 PROTECTION AND REPLACEMENT

A. Replace damaged insulation that cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

B. Protection: Insulation Worker shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

3.5 CLEANING

A. Thoroughly clean all exterior and interior surfaces of ductwork and accessories prior to installation and prior to putting into service.

B. Remove all dirt, rust, dust, etc. from material after installation.

C. Remove and dispose of all debris and waste from the Site resulting from installation.

3.6 SCHEDULES

A. Insulation Omitted - Do not insulate the following:

1. Access door, test hole fittings, damper quadrants, except as otherwise specified. The adjoining insulation shall be neatly finished around such devices.

2. Exhaust ductwork need not be thermally insulated, except the portion of the duct between motorized spill damper and spill louver and exterior exhaust duct leading to energy recovery ventilators HH-ERV-1A, 1B.

3. Exposed supply and return ductwork in conditioned spaces.

4. Omit insulation on ductwork where shown on the Drawings.

B. Exposed Ducts/Plenums in Mechanical Rooms

1. Insulate
   a. All outside air intake/mixing plenums.
   b. Outdoor air intake ducts in their entirety.
   c. Exhaust duct from motorized spill damper to spill louver.
   d. Supply and return ducts.
   e. Exterior supply and exhaust ducts to energy recovery ventilators.

C. Insulation Thicknesses:

1. Insulation for outside air intake ductwork shall be minimum 2 inches thick with a minimum installed thermal resistance value of R-8.

2. Supply and Return ductwork shall be minimum 2 inches thick with a minimum installed thermal resistance value of R-6.

3. Insulation for all other ductwork shall be minimum 1-1/2 inches thick with a minimum installed thermal resistance value of R-5.

D. Insulation Types:

1. Flexible thermal insulation shall be used on ductwork in concealed spaces.

2. Rigid thermal insulation shall be used on ductwork in exposed spaces, including outdoors.

3. Acoustical thermal insulation shall be used on ductwork shown on the Drawings

E. Insulation Locations:

1. All supply, return, and exhaust ductwork and plenums including appurtenances (e.g., , volume dampers, diffusers, grilles, etc.) associated with air conditioning units (except those located within air conditioned spaces).

2. All outside air intake ducts and plenums from the outside air intake louver, outside air intake shaft, or roof mounted intake up to the point where the duct or plenum is connected to the unit in heated or air conditioned spaces.

3. All heated or air conditioned ductwork located outdoors or in unheated spaces.

4. Any additional ductwork and plenums including appurtenances where condensation may occur due to contact with surrounding atmosphere.

END OF SECTION

SECTION 23 07 19

HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install HVAC piping insulation complete with accessories. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. This section includes:

1. HVAC Piping Insulation:
   a. Fiberglass Thermal Insulation (for hydronic piping)
   b. Flexible-Elastomeric Thermal Insulation (for refrigerant piping)
   c. Protective Jacketing

C. Coordination:

1. HVAC piping insulation shall not be installed until piping has been field tested and approved by Engineer.

2. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the HVAC piping insulation Work.

3. Notify other Contractors in advance of the installation of HVAC piping insulation to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before, the HVAC piping insulation Work.

D. Related Sections:

1. Section 23 05 29, Hangers and Supports for HVAC Ductwork, Piping, and Equipment

2. Section 23 05 53, Identification for HVAC Piping and Equipment.

3. Section 23 21 13, Hydronic Piping.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM C411 – Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

3. ASTM C449 – Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.

B. National Fire Protection Association (NFPA).

1. NFPA 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems.

2. NFPA 90B – Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

3. NFPA 255 – Standard Method of Test of Surface Burning Characteristics of Building Materials.

C. Underwriters Laboratories Inc. (UL).

1. UL 723 – Test for Surface Burning Characteristics of Building Materials.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
   a. Engage an experienced installer to perform the work of this Section who has specialized in installing HVAC piping insulation similar to that required for this Project and who is acceptable to manufacturer.

B. Regulatory Requirements:

1. National Fire Protection Association (NFPA).

2. Underwriters Laboratories Inc. (UL).

3. Local and State Building Codes and Ordinances.

4. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Drawings showing fabrication methods, assembly, accessories, and installation details.

2. Product Data:
   a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all material.
   b. Deviations from Contract Documents. Any exceptions to the Contract Documents must be clearly defined. Contractor shall be responsible for any additional expenses that may occur due to any exception made.
   c. Other technical data related to specified material and equipment as requested by Engineer.

B. Informational Submittals: Submit the following:

1. Certificates:
   a. Independent certification reports:
      1) UL Label.

2. Manufacturer Instructions:
   a. Instructions and recommendations for handling, storing, protecting the material.
   b. Installation Data.

3. Source Quality Control Submittals:
   a. Factory test reports.

4. Qualifications Statements:
   a. Manufacturer, when requested by Engineer.
   b. Installer, when requested by Engineer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all material in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to material or components. Replace lost material or components and repair damage to new condition, in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design Criteria:

1. All insulation systems including covering, mastics, adhesives, sealers and facings shall have the following Fire Hazard Classifications in accordance with ASTM E84 or UL 723:
   a. Flame Spread Index: 25 maximum.
   b. Smoke Developed Index: 50 maximum.

2. All insulation systems shall not flame, glow, smolder or smoke when tested in accordance ASTM C411 at service temperature of 220 degrees F.

3. All insulation systems shall meet fire safety standards NFPA 90A, 90B, and 255 where applicable.

2.2 DETAILS OF MATERIALS

A. Fiberglass Thermal Insulation:

1. Product and Manufacturer: Provide one of the following:
   a. Model FIBERGLAS SSL II – ASJ, as manufactured by Owens Corning.
   b. Model Micro-Lok HP, as manufactured by Johns Manville.
   c. Or equal.

2. Type: Heavy density sectional pipe insulation with a smooth, reinforced, wrinkle resistant all-service vapor retarder jacket and self-sealing adhesive lap.

3. Density: Minimum three pound per cubic foot.

4. Thermal Conductivity: Maximum 0.23 Btu-in/hr-ft2-degree F at 75 degrees F mean temperature.

5. Water Vapor Transmission: Maximum 0.02 perm.

6. Fittings: Molded fiberglass, or pre-cut fiberglass inserts.

7. Fittings Covers: PVC Plastic: Zeston or Proto, one-piece molded type fitting covers and jacketing material, gloss white. Connections: Tacks, pressure sensitive color matching vinyl tape.

8. Jointing Materials: Manufacturer's recommended adhesives and tape.

9. Valve Insulation: Miter cut nesting size covering segments of same thickness as pipeline, for insulation of valves.

B. Flexible-Elastomeric Thermal Insulation:

1. Product and Manufacturer: Provide one of the following:
   a. Model Armaflex Tube Insulation, as manufactured by Armacell.
   b. Model Insul-Tube Insulation, as manufactured by K-Flex USA.
   c. Or equal.

2. Type: Expanded close cell structure elastomeric thermal insulation.

3. Density: Minimum three pound per cubic foot.

4. Thermal Conductivity: Maximum 0.25 Btu-in/hr-ft2-degree F at 75 degrees F mean temperature.

5. Water Vapor Transmission: Maximum 0.05 perm.

6. Provide manufacturer's approved contact adhesive for sealing seams and butt joints.

C. Accessories:

1. Aluminum Protective Jacketing (for outdoor pipe insulation application):
   a. Product and Manufacturer: Provide one of the following:
      1) Model Strap-On, as manufactured by Pabco-Childers Metals.
      2) Model Insul-Mate, as manufactured by RPR Products, Inc.
      3) Or equal.
   b. Material: Smooth aluminum (Alloy 3003 – H-14).
   c. Thickness: 0.016-inch.
   d. Moisture Retarder: 3-mil thick coextrusion of polyethylene and DuPont's Surlyn.
   e. Fastening: Continuous modified Pittsburgh Z-lock longitudinal seam with self-gauging 2-inch built-in overlap.
   f. Bands: 1/2-inch stainless steel bands with wing seals.
   g. Fittings:
      1) Type: Pre-fabricated aluminum (Alloy 3003 – H-14) fittings.
      2) Thickness: 0.016-inch.

2.3 IDENTIFICATION

A. All HVAC piping insulation identification shall be provided in accordance with Section 23 05 53, Identification for HVAC Piping and Equipment.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. All HVAC piping leaks shall be repaired prior to installation of HVAC piping insulation.

C. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.2 INSTALLATION

A. General:

1. Install the material in accordance with the Contract Documents and by manufacturer's instructions and recommendations. Obtain written interpretation from Engineer in the event of conflict between manufacturer's instructions and recommendations and the Contract Documents.

2. Install in accordance with Laws and Regulations.

3. Do not modify structures to facilitate installation of material, unless approved in writing by Engineer.

4. Installation to conform to requirements of all local and state codes.

B. HVAC piping insulation shall be continuous through walls and floor openings except where walls or floors are required to be firestopped or required to have a fire resisting rating.

C. Fire Seal Application: Where pipes pass through fire walls, fire partitions, fire rated pipe chase walls or floors above grade, insulation shall pass through and a UL classified assembly shall be provided. Refer to Section 07 84 00 - Firestopping.

D. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other.

E. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

F. Maintain integrity of vapor-barrier jackets on pipe insulation and protect to prevent puncture or other damage.

G. Valves shall be insulated up to packing unit.

H. Fiberglass insulation joints shall be sealed with butt strips that are compatible with the required facing. Stapling shall not be required to complete the closure. Manufacturer's data regarding thickness constraints in relation to operating temperature shall be followed. On cold systems, vapor barrier shall be provided. All penetrations and exposed ends of insulation shall be sealed with mold resistant vapor barrier mastic.

I. Insulation on all cold surfaces shall be applied with a continuous, unbroken vapor seal. Hangers, supports, anchors etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.

J. All surface finishes are to be extended to protect all surfaces, ends and raw edges of insulation.

K. General valves, fittings, etc. shall be insulated as follows:

1. Preformed PVC fitting covers with factory precut Hi-Lo Temp insulation insert of the same thickness as adjoining pipe insulation will be accepted. Valves, fittings, etc. shall be insulated by applying the proper factory precut Hi-Lo Temp insulation insert to the pipe fitting, valve, etc. The ends of the Hi-Lo Temp insulation insert shall be tucked snugly into the throat of the fitting, valve etc. and the edges adjacent to the pipe covering tufted and tucked in, fully insulating the pipe fitting, valve, etc. Vapor barrier mastic compatible with the PVC shall be applied around the edges of the adjoining pipe insulation and on the fitting cover throat overlap seam. The PVC fitting cover shall then be applied and shall be secured with pressure sensitive tape along the circumferential edges. The tape shall extend over the adjacent pipe insulation and have an overlap on itself at least 2" on the downward side.

L. Where hangers are in direct contact with low temperature piping the hanger and supporting rod shall be wrapped with foil-faced blanket insulation and vapor sealed. Hanger rod insulation and vapor barrier shall extend up to the rod a minimum distance equal to the diameter of the pipe.

M. Install insulation so as to make surfaces smooth, even, substantially flush with adjacent insulation and installed in a manner to maintain the integrity of the vapor barrier.

N. Provide insulation protection shields for insulated piping supported by pipe hangers. Refer to Specification 23 05 29.

O. Outdoor Piping:

1. All outdoor exposed pipes shall be insulated as required and shall further be protected with a weatherproof finish. Install aluminum jacketing/cladding. Lap longitudinal and transverse circumferential joints with a minimum of 2 inches overlap. Secure jacketing in place with one-half inch by 0.020-inch thick strapping bands and wing seats on maximum 12 inch centers. Installation shall be completely weatherproof.

2. Fitting and valves shall be insulated with segments of the molded insulation and shall be covered using preformed aluminum fittings identical in composition to the jacket. All joints shall overlap 1" and shall be completely weatherproof.

3.3 CLEANING

A. Thoroughly clean and dry all exterior surfaces of HVAC piping and accessories prior to installation.

B. Remove all dirt, rust, dust, etc. from HVAC piping insulation after installation.

C. Remove and dispose of all debris and waste from the Site resulting from installation.

3.4 PROTECTION AND REPLACEMENT

A. All insulation applied in one day shall have the vapor barrier applied the same day and any exposed ends shall be temporarily protected with a moisture barrier and sealed to the piping.

B. Replace damaged insulation during construction that cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

C. Protection: Insulation worker shall advise Contractor of required protection for insulation work during construction period, to avoid damage and deterioration.

3.5 SCHEDULE OF PIPE INSULATION

A. The following piping systems shall be insulated:

1. Hot Water Piping

2. Condensate Drain from Fan Coil Units

3. Refrigerant Piping

4. Boiler Make-up Water

B. Insulation Omitted: Omit insulation on hot piping within radiation enclosures or unit cabinets.

C. Required Thickness (per Table C403.11.3 of the 2020 NYSECC and Tables 6.8.3-1 and 6.8.3-2 of ASHRAE 90.1-2016)

Fluid Operating Temperature Range and Usage (ºF)	Insulation Conductivity BTUin/hrft^{2}ºF	Insulation Conductivity Mean Rating Temperature ºF	Nom Dia <1”	Nom Dia 1” to < 1.5”	NomDia 1.5” to < 4”
141-200	0.25-0.29	125	1.5	1.5	2.0
105-140	0.22-0.28	100	1.0	1.0	1.5
40-60	0.21-0.27	75	0.5	0.5	1.0
<40	0.20-0.26	50	0.5	1.0	1.0

END OF SECTION

SECTION 23 08 00

COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. HVAC commissioning description.

B. HVAC commissioning responsibilities.

1.2 RELATED SECTIONS

A. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC: For requirements and procedures concerning testing, adjusting, and balancing of mechanical systems.

B. Section 23 09 00 - Instrumentation and Control for HVAC: Submittal and training requirements.

C. Section 23 09 23 - Direct-Digital Control System for HVAC: Submittal, training, and programming requirements.

1.3 REFERENCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE Guideline 1 - The HVAC Commissioning Process.

B. Building Commissioning Association:

1. BCA - Commissioning Handbook.

C. National Environmental Balancing Bureau:

1. NEBB - Procedural Standards for Building Systems Commissioning.

D. Testing Adjusting and Balancing Bureau:

1. TABB - Commissioning Manual.

1.4 COMMISSIONING DESCRIPTION

A. HVAC commissioning process includes the following tasks:

1. Testing and startup of HVAC equipment and systems.

2. Equipment and system verification checks.

3. Assistance in functional performance testing to verify testing and balancing, and equipment and system performance.

4. Provide qualified personnel to assist in commissioning tests, including seasonal testing.

5. Complete and endorse functional performance test checklists provided by Commissioning Authority to assure equipment and systems are fully operational and ready for functional performance testing.

6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.

7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to distribution.

8. Provide assistance to Commissioning Authority to develop, edit, and document system operation descriptions.

9. Provide training for systems specified in this Section with coordination by Commissioning Authority.

B. Equipment and Systems to Be Commissioned:

1. New HVAC systems that were installed under this Contract.

2. The following is a partial list of equipment that are included in this HVAC Commissioning:
   a. Piping systems.
   b. Ductwork.
   c. HeatPump/Split system air conditioning units.
   d. Rooftop Units/Air handling units.
   e. Fan Coil Units.
   f. Unit heaters.
   g. Fans.
   h. Indoor air quality.
   i. BMS controls.
   j. Testing, Adjusting and Balancing work.

C. Perform seasonal function performance tests for the following equipment and systems:

1. Heating equipment during heating season.

2. Cooling equipment during cooling season.

1.5 COMMISSIONING SUBMITTALS

A. Draft Forms: Submit draft of functional performance test checklist.

B. Test Reports: Indicate data on system verification form for each piece of equipment and system as specified. Use AABC forms as guidelines.

C. Field Reports: Indicate deficiencies preventing completion of equipment or system verification checks equipment or system to achieve specified performance.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution Requirements: Requirements for submittals.

B. Project Record Documents: Record revisions to equipment and system documentation necessitated by commissioning.

C. Operation and Maintenance Data: Submit revisions to operation and maintenance manuals when necessary revisions are discovered during commissioning.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with NEBB requirements.

1.8 COMMISSIONING RESPONSIBILITIES

A. Equipment or System Installer Commissioning Responsibilities:

1. Attend commissioning meetings.

2. Ensure temperature controls installer performs assigned commissioning responsibilities as specified below.

3. Ensure testing, adjusting, and balancing agency performs assigned commissioning responsibilities as specified.

4. Provide instructions and demonstrations for Owner's personnel.

5. Ensure subcontractors perform assigned commissioning responsibilities.

6. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.

7. Develop startup and initial checkout plan using manufacturer's startup procedures and functional performance checklists for equipment and systems to be commissioned.

8. During verification check and startup process, execute HVAC related portions of checklists for equipment and systems to be commissioned.

9. Perform and document completed startup and system operational checkout procedures, providing copy to Commissioning Authority.

10. Provide manufacturer's representatives to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and are in attendance for duration to complete tests, adjustments and problem-solving.

11. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.

12. Provide personnel to assist Commissioning Authority during equipment or system verification checks and functional performance tests.

13. Prior to functional performance tests, review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during tests.

14. Prior to startup, inspect, check, and verify correct and complete installation of equipment and system components for verification checks included in commissioning plan. When deficient or incomplete work is discovered, ensure corrective action is taken and re-check until equipment or system is ready for startup.

15. Work with manufacturer and Commissioning Authority.

16. Perform verification checks and startup on equipment and systems as specified.

17. Assist Commissioning Authority in performing functional performance tests on equipment and systems as specified.

18. Perform operation and maintenance training sessions scheduled by Commissioning Authority.

19. Conduct HVAC system orientation and inspection.

B. Temperature Controls Installer Commissioning Responsibilities:

1. Attend commissioning meetings.

2. Review design for ability of systems to be controlled including the following:
    a. Confirm proper hardware requirements exists to perform functional performance testing.
    b. Confirm proper safeties and interlocks are included in design.
    c. Confirm proper sizing of system control valves and actuators and control valve operation will result capacity control identified in Contract Documents.
    d. Confirm proper sizing of system control dampers and actuators and damper operation will result in proper damper positioning.
    e. Confirm sensors selected are within device ranges.
    f. Review sequences of operation and obtain clarification from Architect/Engineer.
    g. Indicate delineation of control between packaged controls and building automation system, listing BAS monitor points and BAS adjustable control points.
    h. Provide written sequences of operation for packaged controlled equipment. Equipment manufacturers' stock sequences may be included, when accompanied by additional narrative to reflect Project conditions.

3. Inspect, check, and confirm proper operation and performance of control hardware and software provided in other HVAC sections.

4. Submit proposed procedures for performing automatic temperature control system point-to-point checks to Commissioning Authority and Architect/Engineer.

5. Inspect check and confirm correct installation and operation of automatic temperature control system input and output device operation through point-to-point checks.

6. Demonstrate system performance and operation to Commissioning Authority during functional performance tests including each mode of operation.

7. Provide control system technician to assist during Commissioning Authority verification check and functional performance testing.

8. Provide control system technician to assist testing, adjusting, and balancing agency during performance of testing, adjusting, and balancing work.

9. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

C. Testing, Adjusting, and Balancing Agency Commissioning Responsibilities:

1. Attend commissioning meetings.

2. Participate in verification of testing, adjusting, and balancing report for verification or diagnostic purposes. Repeat sample of 20 percent of measurements contained in testing, adjusting, and balancing report.

3. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

1.9 COMMISSIONING MEETINGS

A. Attend initial commissioning meeting and progress commissioning meetings as required by Commissioning Authority.

1.10 SCHEDULING

A. Prepare schedule indicating anticipated start dates for the following:

1. Piping system pressure testing.
2. Piping system flushing and cleaning.
3. Ductwork cleaning.
4. Ductwork pressure testing.
5. Equipment and system startups.
6. Automatic temperature control system checkout.
7. Testing, adjusting, and balancing.
8. HVAC system orientation and inspections.
9. Operation and maintenance manual submittals.
10. Training sessions.

B. Schedule seasonal tests of equipment and systems during peak weather conditions to observe full-load performance.

C. Schedule occupancy sensitive tests of equipment and systems during conditions of both minimum and maximum occupancy or use.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install additional balancing dampers, balancing valves, access doors, test ports, and pressure and temperature taps required to meet performance requirements.

B. Place HVAC systems and equipment into full operation and continue operation during each working day of commissioning.

C. Install replacement sheaves and belts to obtain system performance, as requested by Commissioning Authority.

D. Install test holes in ductwork and plenums as requested by Commissioning Authority for taking air measurements.

E. Prior to start of functional performance test, install replacement filters in equipment

3.2 FIELD TESTS AND INSPECTIONS

A. Seasonal Sensitive Functional Performance Tests:

1. Test heating equipment at winter design temperatures.

2. Test cooling equipment at summer design temperatures

B. Be responsible to participate in initial and alternate peak season test of systems required to demonstrate performance.

C. Occupancy Sensitive Functional Performance Tests:

1. Test equipment and systems affected by occupancy variations at minimum and peak loads to observe system performance.

END OF SECTION

SECTION 23 09 23

DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, material, equipment, related services, supervision and incidentals required, including, but not limited to, specified products and required to furnish, install, configure a Direct-Digital Control System (DDCS) for HVAC systems, including all necessary hardware and all operating and applications software as required for the complete performance of the Work as shown on the Drawings and as specified herein. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. Section includes:

1. System Description.
2. Controllers.
3. Hard-wired Devices
4. Electronic Input/Output Devices
5. Switches
6. Air Flow Measuring Stations
7. Control Valves
8. Electrical Control Power and Low Voltage Wiring
9. Panels and Enclosures
10. DDC Hardware Identification.
11. Controller software.
12. HVAC control programs.
13. Sequence Of Operations.

C. Description

1. The scope intent is to maintain continuity with the existing Building Automation System (BAS) infrastructure by engaging the incumbent BAS provider, Automated Logic representative. However, the Mechanical Contractor may solicit proposals from other qualified Automatic Temperature Control (ATC) contractors, as long as they partner with an authorized Automated Logic dealer. Any chosen contractor must be able to demonstrate seamless integration of all new controllers into the existing Alerton-based BAS architecture.

2. Automatic temperature control field monitoring and control system using field programmable microprocessor-based units with communication to the existing DDCS. New controllers shall be connected to the existing DDCS network (BACnet, MS/TP) and must be seen and operated through the existing DDCS user interface.

3. Base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.

4. Include computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.

5. Provide control systems consisting of thermostats, control valves, dampers, and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.

6. Include installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

7. HVAC equipment provided with factory control systems shall communicate with the DDCS via a BACnet interface for global monitoring and control via the DDCS:

D. The Work also includes:

1. DDCS panels.

2. Direct digital controllers.

3. Sensors, controllers, thermostats, mounting accessories, junction boxes, face plates, wall plates, covers, mounting hardware as required.

4. Relays, selector switches, pushbuttons, indicating lights,

5. Other control devices and appurtenances, as required.

6. Power and control wiring and conduit: The conduit and wiring to be provided under this Section shall include the following:
    a. All wiring and conduit from each DDCS panel to sensors, controllers, switches, dampers, valves, louvers, HVAC equipment panels, smoke purge panels, audio visual alarms, etc.
    b. All wiring and conduit between HVAC equipment panels and associated field devices.
    c. Any other HVAC device requiring control under this Contract.
    d. All power wiring and conduit to DDCS panels, except where specified to be provided under the Electrical Contract.
    e. Conduit layouts for these wiring requirements are not shown; CONTRACTOR shall determine the requirements based upon the arrangement of the components being furnished.

E. Work Furnished Under the Electrical Contract:

1. All 3 phase power wiring and conduit.

2. 120 volt, single phase power wiring and conduit for the following:
    a. Power to DDCS panels.
    b. Power from DDCS panels to single phase fans and pumps controlled from the DDCS panels.

3. Starters.

4. Disconnects, except where specified to be furnished under the HVAC Contract.

5. "HAND/OFF/AUTOMATIC" selector switches, lockout stops, pushbuttons, "START/STOP" switches, and indicating lights, except those located at DDCS panels, which shall be provided under the HVAC Contract.

6. Control wiring and conduit and status wiring and conduit from motor control centers to DDCS panels.

7. Control wiring and conduit and status wiring and conduit from VFD's to DDCS panels except where VFD's are provided within packaged HVAC equipment.

8. Control wiring and conduit and status wiring and conduit from the Fire Alarm System panels to the DDCS panels for each fire alarm zone.

9. Smoke detectors.

10. Signal wiring and conduit where specified to be provided under the Electrical Contract.

F. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, Instrumentation and Control for HVAC Work.

2. Notify other contractors in advance of the installation of Instrumentation and Control for HVAC items to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, Instrumentation and Control for HVAC Work.

G. Related Sections:

1. Section 23 05 53, Identification for HVAC Piping and Equipment.

2. Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

3. Section 23 34 23, HVAC Power Ventilators.

4. Section 23 72 00, Packaged Outdoor Heating-Only Makeup-Air Units .

5. Section 23 82 00, Convection Heating And Cooling Units.

6. Section 23 81 26, Split Heat Pump Air Conditioning System

7. Division 26 related sections.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American National Standards Institute, (ANSI).

2. Institute of Electrical and Electronic Engineers, (IEEE).

3. The Instrumentation, Systems and Automation Society, (ISA).

4. National Electrical Code, (NEC).
   a. NFPA 79, Electrical Standard for Industries Machinery.

5. National Electrical Manufacturers Association, (NEMA).

6. National Fire Protection Association, (NFPA).
   a. NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems

7. Underwriters' Laboratories, Inc., (UL).
   a. UL 873, Standard for Temperature-Indicating and -Regulating Equipment.
   b. UL 916, Standard for Energy Management Equipment.
   c. UL 555S, Standard for Smoke Dampers.

8. ANSI/ASHRAE Standard 135, BACnet - A Data Communication Protocol for Building Automation and Control Systems

1.3 DEFINITIONS

A. Unless specifically defined within the Contract Documents, the words or acronyms contained within this specification shall be as defined within, or by the references listed within this specification, the Contract Documents, or, if not listed by either, by common industry practice.

B. Definitions:

1. Supplier: The Supplier shall be Contractor and manufacturer jointly, that has undivided responsibility for the engineering, design, installation and commissioning of a complete and fully functional DDCS with all required appurtenances. An approved representative of the manufacturer is an acceptable substitute to for the manufacture where independent control Contractors are authorized by the manufacturer to provide their products and services.

C. Acronyms:

1. General
   a. ASHRAE: American Society Heating, Refrigeration, Air Conditioning Engineers
   b. AHU: Air Handling Unit
   c. ASC: Application Specific Controllers
   d. ATC: Automatic Temperature Control
   e. BACnet: Building Automation Controls Network
   f. BMS: Building Management System
   g. BAS: Building Automation System
   h. DDC: Direct Digital Control
   i. DDCS:Direct-Digital Control System
   j. EIA: Electronic Industries Alliance
   k. GUI: Graphical User Interface
   l. HVAC: Heating, Ventilation, and Air Conditioning
   m. IEEE: Institute Electrical Electronic Engineers
   n. MBPS: Mega Bites Per Second
   o. MER: Mechanical Equipment Room
   p. PID: Proportional, Integral, Derivative

2. Communications and protocols
   a. ARP: Address Resolution Protocol
   b. BACnet: Building Automation and Control Networks
   c. CORBA: Common Object Request Broker Architecture
   d. CSMA/CD: Carrier Sense Multiple Access/Collision Detect
   e. DDE: Dynamic Data Exchange
   f. FTP: File Transfer Protocol
   g. FTT: Free Topology Transceivers
   h. HTTP: Hyper Text Transfer Protocol
   i. IIOP: Internet Inter-ORB Protocol
   j. IP: Internet Protocol
   k. LAN: Local Area Network
   l. LON: Echelon Communication – Local Operating Network

m. MS/TP: Master Slave Token Passing
n. OBIX: Open Building Information Exchange
o. ODBC: Open Database Connectivity
p. ORB: Object Request Broker
q. SNVT: Standard Network Variables Types
r. SQL: Structured Query Language
s. UDP: User Datagram Protocol
t. XML: eXtensible Markup Language

3. Controllers
   a. ASD: Application Specific Device
   b. AAC: Advanced Application Controller
   c. ASC: Application Specific Controller.
   d. CAC: Custom Application Controller.
   e. DCU: Distributed Control Unit
   f. LCM: Local Control Module
   g. MC: MicroControllers
   h. MPC: Multi-purpose Controller
   i. NSC: Network Server Controller
   j. PEM: Package Equipment Module
   k. PPC: Programmable Process Controller
   l. RC: Room controller
   m. SDCU: Standalone Digital Control Units
   n. SLC: Supervisory Logic Controller
   o. UEC: Unitary Equipment Controller
   p. VAVDDC: Variable Air Volume Direct Digital Controller

4. Tools and Software
   a. AFDD: Automated Fault Detection and Diagnostic
   b. APEO: Automated Predictive Energy Optimization
   c. DR: Demand Response
   d. CCDT: Configuration, Commissioning and Diagnostic Tool
   e. BPES: BACnet Portable Engineering Station
   f. LPES: LON Portable Engineering Station
   g. POT: Portable Operator's Terminal
   h. PEMS: Power and Energy Management Software
   i. MTBF: Mean Time Between Failure

1.4 SYSTEM PERFORMANCE

A. Performance Standards. System shall conform to the following minimum standards over network connections. Systems shall be tested using manufacturer's recommended hardware and software for display through the existing BAS.

1. Graphic Refresh. A graphic with 20 dynamic points shall update with current data within 8 sec. and shall automatically refresh every 15 sec.

2. Configuration and Tuning Screens. Screens used for configuring, calibrating, or tuning points, PID loops, and similar control logic shall automatically refresh within 6 sec.

3. Object Command. Devices shall react to command of a binary object within 2 sec. Devices shall begin reacting to command of an analog object within 2 sec.

4. Alarm Response Time. An object that goes into alarm shall be annunciated at the browser within 45 sec.

5. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 sec.

6. Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per sec. Select execution times consistent with the mechanical process under control.

7. Multiple Alarm Annunciation. Each user, connected to network accessing the system through their browser (workstation), shall receive alarms within 5 seconds of one another.

8. Reporting Accuracy. System shall report values with minimum end-to-end accuracy listed in Table 1.

9. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances listed in Table 2

Table-1
Reporting Accuracy

Measured Variable	**Reported Accuracy**
Space Temperature	±0.5ºC (±1ºF)
Ducted Air	±0.5ºC (±1ºF)
Outside Air	±1.0ºC (±2ºF)
Dew Point	±1.5ºC (±3ºF)
Water Temperature	±0.5ºC (±1ºF)
Delta-T	±0.15º (±0.25ºF)
Relative Humidity	±5% RH
Water Flow	±2% of full scale
Airflow (terminal)	±10% of full scale (see Note 1)
Airflow (measuring stations)	±5% of full scale
Airflow (pressurized spaces)	±3% of full scale
Air Pressure (ducts)	±25 Pa (±0.1 in. w.g.)
Air Pressure (space)	±3 Pa (±0.01 in. w.g.)
Water Pressure	±2% of full scale (see Note 2)
Electrical (A, V, W, Power Factor)	±1% of reading (see Note 3)
Carbon Monoxide (CO)	±5% of reading
Carbon Dioxide (CO_2)	±50 ppm

General Note: Comprehensive variable list applicable for all projects.
Note 1: Accuracy applies to 10%–100% of scale
Note 2: For both absolute and differential pressure
Note 3: Not including utility-supplied meters.

Table 2
Control Stability and Accuracy

Controlled Variable	Control Accuracy	Range of Medium
Air Pressure	±50 Pa (±0.2 in. w.g.) ±3 Pa (±0.01 in. w.g.)	0–1.5 kPa (0–6 in. w.g.) -25 to 25 Pa (-0.1 to 0.1 in. w.g.)
Airflow	±10% of full scale	
Space Temperature	±1.0ºC (±2.0ºF)	
Duct Temperature	±1.0ºC (±2.0ºF)	
Humidity	±5% RH	
Fluid Pressure	±10 kPa (±1.5 psi) ±250 Pa (±1.0 in. w.g.)	MPa (1–150 psi) 0–12.5 kPa (0–50 in. w.g.) differential

General Note: Comprehensive variable list applicable for all projects.

1.5 QUALITY ASSURANCE

A. General:

1. The DDCS shall be furnished by a single Supplier responsible for the adequacy, performance and configuration of all items.

2. All work described in this section shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work and in the regular employment of the approved manufacturer's local field office.

3. Supervision, hardware and software engineering, calibration and checkout of the system shall be by the employees of the manufacturer or manufacturers approved technical representative.

4. Provide DDCS components and ancillary equipment, which are UL-916 listed and labeled.

5. All components used in conditioned air streams, spaces or return air plenums shall comply with NFPA 90A Flame/Smoke rating of 25/50.

6. All wiring shall conform to the National Electrical Code.

7. All smoke dampers shall be rated in accordance with UL 555S.

8. Comply with FCC rules, Part 15 regarding Class A radiation for computing devices and low power communication equipment operating in commercial environments.

9. Comply with FCC, Part 68 rules for telephone modems and data sets.

B. Supplier's Qualifications:

1. Shall have a minimum of 5 years of installation experience with the manufacturer and shall provide documentation in the bid and submittal

package verifying longevity of the installing company's relationship with the manufacturer.

2. Shall have an in place support facility within 100 miles of the site with factory certified technicians and engineers, spare parts inventory and all necessary test and diagnostic equipment for the installed system.

3. Shall have the capability to provide on-site service within a 2 hour period.

4. Shall have 24 hours/day, 7 days/week emergency service available.

5. Shall be a financially sound firm having at least five years continuous experience in designing, implementing, supplying and supporting control systems at similar facilities which are comparable to the DDCS in terms of hardware, software, cost and complexity.

6. Shall have manufactured and supported standard lines of digital processing and control equipment and application software continuously for the last five years.

7. Shall have in existence an experienced engineering and technical staff capable of designing, implementing, supplying and supporting the DDCS and handling the DDCS submittal and training requirements.

8. Shall provide system hardware components and software packages of fully developed, field proven standardized designs and therefore shall furnish a system which is not a highly unique, custom one-of-a-kind system.

9. Shall have a minimum of five years' experience in software configuration, hardware application, programming, and data highway systems.

10. Shall provide standard course offerings in general control applications and in operation, programming and maintenance of the control system and equipment at a facility specifically utilized for training purposes. The facility shall have been in operation continuously for the last two years.

11. Shall have a demonstrated record of prompt response to field failures.

12. Shall have a documented program of failure analysis.

13. Shall utilize a UL approved panel shop.

C. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single Supplier.

2. The Supplier shall review and approve or prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall equipment assembly by the Supplier.

1.6 SUBMITTALS

A. Action Submittals: Submit the following:

1. 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 11” x 17” size or larger.

2. 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.

3. Submittal data shall contain manufacturer's data on all hardware and software products required by the specification. Valve, damper and air flow station schedules shall indicate size, CV where applicable, configuration, capacity and location of all equipment.

4. 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. If color has been used to differentiate information, the information shall be in color.

5. Information common to the entire system shall be provided. This shall include but not be limited to the following.
   a. Product manuals for the key software tasks.
   b. Operating the system.
   c. Administrating the system.
   d. Engineering the operator workstation.
   e. Application programming.
   f. Engineering the network.
   g. Setting up the web server.
   h. Report creation.
   i. Graphics creation.
   j. All other engineering tasks.
   k. System architecture diagram.
   l. List of recommended maintenance tasks associated with the system servers, operator workstations, data servers, web servers and web clients.
   m. Define the task.
   n. Recommend a frequency for the task.
   o. Reference the product manual that includes instructions on executing the task.
   p. Licenses, guarantees, and warranty documents for equipment and systems.

q. Submit one copy for each building, plus two extra copies.

6. Information common to the systems in a single building shall be provided.
   a. System architecture diagram for components within the building annotated with specific location information.
   b. As-built drawing for each control panel.
   c. As-built wiring design diagram for all components.
   d. Installation design details for each I/O device.
   e. As-built system flow diagram for each system.
   f. Sequence of operations for each system.
   g. Binding map for the building.
   h. Product data sheet for each component.
   i. Installation data sheet for each component.
   j. Submit two copies for each building and two extra copies.

7. Software shall be provided:
   a. Submit a copy of all software installed on the servers and workstations.
   b. Submit all licensing information for all software installed on the servers and workstations.
   c. Submit a copy of all software used to execute the project even if the software was not installed on the servers and workstations.
   d. Submit all licensing information for all the software used to execute the project.
   e. All software revisions shall be as installed at the time of the system acceptance.
   f. Firmware Files
   g. Submit a copy of all firmware files that were downloaded to or pre-installed on any devices installed as part of this project.
   h. This does not apply to firmware that is permanently burned on a chip at the factory and can only be replaced by replacing the chip.
   i. Submit a copy of all application files that were created during the execution of the project.
   j. Submit a copy of all graphic page files created during the execution of the project.

8. Panel and Cabinet Information:
   a. Layout Drawings, including the following:
      1) Front views to scale.
      2) Dimensional information.
      3) Functional name of components mounted in and on panel.
      4) Product information on all panel components.
      5) Nameplate location and legend including text, letter size and colors to be used.
      6) Location of anchoring connections and holes.
      7) Location of external wiring connections.
      8) Mounting, support and installation details.

   b. Wiring diagrams, including the following:
      1) Name of panel, console or cabinet.
      2) Wiring sizes and types.
      3) Terminal strip numbers.

4) Color coding.
5) Functional name and manufacturer's designation for components to which wiring is connected.

c. Electrical control schematics in accordance with NFPA 79 Standards.

9. Conduit Layout Information:
   a. Conduit layout drawings showing proposed routing of exposed and concealed conduits.
   b. Drawings shall show locations of pull boxes, junction boxes, and all building penetrations.
   c. All conduits shall have proper identification as to size and quantity of wire.

B. Informational Submittals: Submit the following:

1. Source Quality Control Submittals:
   a. Submit factory test reports.

2. Site Quality Control Submittals:
   a. Submit field Test Reports.

3. Qualifications Statements:
   a. Supplier’s Qualifications Data:
      1) Submit qualifications data as required in Paragraph 1.5.B, above.

C. Closeout Submittals: Submit the following

1. Operations and Maintenance Manuals:
   a. Operation and Maintenance Manuals shall conform to the requirements of Section 01 78 23, Operation and Maintenance Data and the supplemental requirements below.
   b. The Operation and Maintenance Manuals shall include the following:
      1) Name, address, e-mail address and telephone number of the Supplier's local service representative.
      2) Complete list of supplied system hardware parts with full model numbers referred to system part designations, including spares.
      3) Copy of all approved submittal information and system Shop Drawings.
      4) The following is a list of post construction submittals that shall be updated to reflect any changes during construction and re-submitted as “As-Built”.
         a) System architecture drawing.
         b) Layout drawing for each control panel
         c) Wiring diagram for individual components
         d) System flow diagram for each controlled system
         e) Instrumentation list for each controlled system
         f) Sequence of operation
         g) Binding map
         h) A matrix sheet detailing all system addresses and communication settings

5) Safety considerations relating to operation and maintenance procedures.

2. Record Documentation:
   a. CONTRACTOR and Supplier shall revise all system drawings, submittals and software documentation to reflect as-built conditions in accordance with the requirements of the Contract Documents.
   b. Half-size black line prints of wiring diagrams and any program or configuration printouts applicable to each control panel shall be placed inside a clear plastic envelope and stored in a suitable print pocket or container inside each control panel.

D. Maintenance Material Submittals: Furnish the following:

1. Spare Parts:
   a. Spare parts and testing equipment list with recommended quantities to be provided.

1.7 SOFTWARE OWNERSHIP

A. The OWNER shall retain licenses to software.

B. The OWNER shall sign a copy of the manufacturer's standard software and firmware licensing agreement as a condition of this contractor. Such license shall grant use of all programs and application software to the OWNER as defined by the manufacturer's license agreement but shall protect the manufacturer's rights to disclosure of Trade Secrets contained within such software.

C. The licensing agreement shall not preclude the use of the software by individuals under contract to the OWNER for commissioning, servicing or altering the system in the future. Use of the software by individuals under contract to the OWNER shall be restricted to use on the OWNER's computers and only for the purpose of commissioning, servicing, or altering the installed system.

D. All project developed software, files and documentation shall become the property of the OWNER. These include but are not limited to:

1. Server and workstation software

2. Application programming tools

3. Configuration tools

4. Network diagnostic tools

5. Addressing tools

6. Application files

7. Configuration files

8. Graphic files

9. Report files

10. Graphic symbol libraries

11. All documentation

1.8 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. DDCS equipment shall be packaged at the factory prior to shipment to protect each item from damage during shipment and storage. Containers shall be protected against impact, abrasion, corrosion, discoloration and/or other damages.

2. Clearly label contents of each container and provide information on the required storage conditions necessary for the equipment. Keep OWNER and ENGINEER informed of equipment delivery.

3. Deliver materials to the Site to ensure uninterrupted progress of the Work.

B. Storage and Protection:

1. Store materials and equipment to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms or other supports. Protect metal enclosures and parts and other material from corrosion.

2. Supplier shall notify CONTRACTOR, in writing, of the storage requirements and recommendations for the equipment prior to shipment.

3. Protection of materials and equipment shall comply with the requirements of Division 01, General Requirements, and in accordance with manufacturer's instructions and relevant organization standards.

4. Store all material in covered storage and protect from condensation and in accordance with the manufacturer’s recommendations.

5. Store computers and electronic devices in a secure environmentally control warehouse.

C. Acceptance At Site:

1. All boxes and crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to the components or equipment. Replace lost equipment or components and repair damage to like new condition in accordance with the manufacturer's requirements.

1.9 WARRANTY

A. The warranty specified in this Article shall not deprive OWNER of other rights or remedies OWNER may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under the Contract Documents.

B. All components, system software, and parts furnished and installed by the Supplier shall be guaranteed against defects in materials and workmanship for 1 year after substantial completion. Labor to repair, reprogram, or replace these components shall be provided. All corrective software modifications made during warranty periods shall be updated on all user documentation and on user and manufacturer archived software disks.

PART 2 - PRODUCTS

2.1 CONTROLLERS – GENERAL REQUIREMENTS

A. Custom Application Controllers (CAC) shall contain their control programs in programmable non-volatile memory and their operating systems in firmware. Each CAC shall have the intelligence to perform control strategies without communication to other control units.

B. CAC and Intelligent Devices shall be able to have their sequence of operation program edited and/or modified. The inputs and outputs shall be able to be configured and reconfigured to permit the controller to accept field modifications and/or different operating strategies. Each controller shall complete an entire internal scan in less than one second. Each internal scan shall consist of updating inputs, making necessary mathematical calculations, and sequencing appropriate outputs for local control.

C. When Application Generic Controllers (AGC) and/or Custom Application Controllers (CAC) are applied, provide the following minimum spare points for each controller:

1. (2) Universal Inputs (AI/BI), or

2. (1) Analog Input AND (1) Binary Input.

3. (1) Analog Output.

4. (1) Binary Output.

D. Acceptable Manufacturers

1. Automated Logic

2. Schneider Electric.

3. Siemens.

4. Johnson Controls.

5. Honeywell.

6. Distech.

7. Or approved equal.

2.2 APPLICATION GENERIC CONTROLLER (AGC)

A. Application Generic Controllers shall be equipped with a minimum of 64K programmable non-volatile (flash) memory for general data processing, power supply, input/output modules, termination blocks, network transceivers.

B. Operating system software, operating sequence software and application programs, as approved by the AEOR/FMSI, shall be stored in programmable, non-volatile memory.

C. The AGC unit shall be equipped with a dedicated clock battery, continuously recharged via trickle-current, or equivalent.

D. AGC Interface Software:

1. General: AGC shall be configured, not programmed, via PC based interface software.

2. AGC shall provide a selection of control function blocks that can be configured.

2.3 CUSTOM APPLICATION CONTROLLER (CAC)

A. Custom BACnet Application Controllers shall be equipped with a minimum of 64K programmable non-volatile (flash) memory for general data processing, power supply, input/output modules, termination blocks, network transceivers.

B. Operating system software, custom operating sequence software and application programs shall be stored in programmable, non-volatile memory.

C. The CAC unit shall be equipped with a dedicated clock battery, continuously recharged via trickle-current, or equivalent.

D. CAC Software

1. General: A CAC shall be able to operate in stand-alone mode, as needed for specified control applications. Software shall include a complete operating system (O.S.), communications handler, point processing, standard control algorithms, and specific control sequences.

2. O.S. software shall reside in programmable flash memory, operate in real-time, provide prioritized task scheduling, control time programs, monitor and manage CAC to OI communications, and scan inputs and outputs. O.S. shall also contain built in diagnostics.

3. Input/Output Point Processing Software shall include:
   a. Continuous update of input and output values and conditions. All continuous points are to be updated at a minimum of one-second intervals.
   b. Reasonability checks on all analog inputs against the previously read value and discards those values falling outside pre-programmed reasonability limits.
   c. Assignment of proper engineering units and status condition identifiers to all analog and digital input and outputs.
   d. Analog input alarm comparison with the ability to assign two individual sets of high and low limits (warning and actual alarm) to an input or to assign a set of floating limits (alarm follows a reset schedule or control point) to the input. Each alarm shall be assigned a unique differential to prevent a point from oscillating into and out of alarm. Alarm comparisons shall be made each scan cycle.
   e. De-bounce of digital inputs to prevent nuisance alarms. De-bounce timing shall be adjustable from two seconds to two minutes in one-second increments.

4. Alarm Lockouts
   a. Alarm lockout software shall be provided to prevent nuisance alarms. On initial start-up of air handler and other mechanical equipment a "timed lockout" period shall be assigned to analog points to allow them to reach a stable condition before activating alarm comparison logic. Lockout period is to be programmable on a per point basis from 0 to 90 minutes in one-minute increments.

5. Custom DDC Control Loops
   a. Custom DDC programs are to be provided to meet the control strategies as called for in the sequence of operation sections of these specifications. Each DDC Controller shall have residential in its memory and available to the programs a full library of DDC algorithms, intrinsic control operators, arithmetic, logic and relational operators for implementation of control sequences:
      1) All DDC set points, gains and time constants associated with DDC programs shall be available to the operator for display and modification via the SOC (portable operator's terminal).

2) DDC control programs shall include an assignment of initialization values to all outputs to assure that controlled devices/controllers assume a fail-safe position on initial system start-up.

2.4 HARD-WIRED DEVICES

A. Outside air temperature or humidity sensors, occupancy buttons or CO_2 sensors are to be hard wired. All outdoor applications shall utilize NEMA 4x enclosures. All primary control loop sensors such as duct pressure transmitters; space temperature or humidity sensors are to be hard-wired to the controller's I/O points.

2.5 ELECTRONIC INPUT/OUTPUT DEVICES

A. Temperature and Humidity Sensors and Transmitters

1. General Sensor & Transmitter Requirements
   a. Provide sensors and transmitters required as outlined in the input/output summary and sequence of operation and as required achieving the specified accuracy as specified herein.
   b. Temperature transmitters shall be equipped with individual zero and span adjustments. The zero and span adjustments shall be non-interactive to permit calibration without iterative operations. Provide a loop test signal to aid in sensor calibration.
   c. Temperature transmitters shall be sized and constructed to be compatible with the medium to be monitored. Transmitters shall be equipped with a linearization circuit to compensate for non-linearity of the sensor and bridge and provide a true linear output signal.
   d. Temperature sensors shall be of the resistance type and shall be either three-wire 100-ohm platinum RTD, or two-wire 1000-ohm platinum RTD.
   e. Thermistors may be acceptable provided that the temperature vs. resistance curves are contained either in the controller's software or firmware and that its performance is as specified herein elsewhere. Submit proof of the software mathematical equation or the firmware conversion charts together with the temperature/resistance charts from the manufacturer of the sensor. Thermistors shall be of the Thermistor (NTC) Type with a minimum of 100 ohm/F resistance change versus temperature to insure good resolution and accuracy. Thermistors shall be certified to be stable ±0.24F. over five years and ±0.36F. accurate and free from drift for five years.
   f. The following accuracies are required and include errors associated with the sensor, lead wire and A to D conversion.

Point Type	Accuracy
Outside Air	0.5°F
Water	0.5°F
Room Temperature	1.0°F
Duct Temperature	0.5°F

2. Thermowells
   a. Thermo-wells are required for all temperature sensors in fluids transported within piping.
   b. Thermo-wells shall be supplied as a complete assembly including the sensor, separable well, wellhead and Greenfield fitting.
   c. Thermowells shall be pressure rated and constructed in accordance with the system working pressure.
   d. Thermowells and sensors shall be mounted in a threadolet or 1/2" NPT saddle and allow easy access to the sensor for repair or replacement.
   e. Thermowells shall be filled with heat-conductive compound which is specifically manufactured for the application. The compound shall be suitable for the temperature range being sensed.
   f. Thermowells shall be constructed of the following materials:
      1) Brass.

3. Duct-Mounted Sensors
   a. Duct-mounted sensors shall mount in a handibox through a hole in the duct and be positioned so as to be easily accessible for repair or replacement. A neoprene grommet (Sealtite fitting and mounting plate) shall be used on the sensor assembly to prevent air leaks.
   b. Duct sensors shall be insertion type allowable for discharge air temperature measurement.
   c. Acceptable Manufacturers and Model Numbers
      1) Bapi BA/series
      2) Veris Industries TD series
      3) Greystone TE200 Series
      4) GE Sontay Model TT-322
      5) Dwyer Series TE
      6) Or approved equal

4. Duct Relative Humidity & Temperature Sensors
   a. Operating range: 0 to 100% RH
   b. Accuracy at 68ºF (20ºC): ±2% RH, 20-95% RH including hysteresis, linearity, and repeatability
   c. Operating temperature: 32 to 122ºF (-6 to 50ºC)
   d. Temperature effect: Less than 0.06% per degree F
   e. Sensing element: Capacitive
   f. Output signal-RH only units: -20 mA, 0-10 VDC, 0-100% linear, proportional (Provide interface to BACnet controller)
   g. Output signal-RH/T units: 0-10 VDC, 0-100% linear, proportional
   h. Polarity protection
   i. Acceptable Manufacturers and Model Numbers
      1) Siemens Model Number 538-896
      2) Kele GEH series
      3) Bapi Model Number BA/xx-H210
      4) Dwyer Series RH or approved equal

5. Room Relative Humidity Sensors
   a. Operating range: 0 to 100% RH
   b. Accuracy at 77ºF (20ºC): ±2% RH, 20-95% RH including hysteresis, linearity, and repeatability

c. Sensing element: Capacitive
d. Operating temperature: 32 to 122ºF (-6 to 50ºC)
e. Temperature effect: Less than 0.06% per degree F
f. Output signal-RH only units: -20 mA, 0-10 VDC, 0-100% linear, proportional (Provide interface to BACnet controller)
g. Output signal-RH/T units: 4-20 ma DC 0-100% linear, proportional
h. Acceptable Manufacturers and Model Numbers
    1) Greystone Model Number RH200A
    2) Veris Model Number HD2XVSTC2
    3) Kele GEH series
    4) Dwyer Series RH
    5) approved equal

6. Outside Air Temperature and Humidity Sensors
    a. Outside air temperature and humidity sensors shall be designed to withstand the environmental conditions to which they will be exposed. All outdoor applications shall utilize NEMA 4x enclosures. The sensing element shall be 100-ohm platinum RTB with minimum 2% accuracy over the operable range of not less than 30°F to 130°F service. They shall also be provided with a solar shield.
    b. The outside air temperature sensor shall be furnished with a sun-shield to reduce the heating effects of reflected sunlight from adjacent surfaces. This shield surrounding the sensor element shall also protect the sensors against wind velocity effects.
    c. Outside sensors shall be mounted on a north-facing surface, out of direct sunlight, and away from other heat surfaces. Install the outside air humidity and CO2 sensors adjacent to the outside air temperature sensor.
    d. Outside Temperature and humidity sensors shall comply with the section 2.8.and shall be rated for ambient temperatures.
    e. Acceptable Manufacturers and Model Numbers
        1) Bapi BA/xx-H210-0-EU
        2) Veris HO series
        3) Greystone TE200 series
        4) Or approved equal

7. Room Sensors (Temperature Only)
    a. Terminal unit temperature sensors shall all be of the thermistor (NTC) type with a 100-ohm/oF resistance change versus temperature change to insure good resolution and accuracy.
    b. Sensor shall be supplied with a vertical base for mounting on a standard single gang junction box supplied by the ATC Contractor.
    c. Space sensors shall utilize the local occupancy button to override the unoccupied mode to occupied for a 2-hour time period.
    d. Sensors shall be able to provide access to a local BACnet network using built-in communication jack.
    e. Acceptable Manufacturers and Model Numbers
        1) Bapi BA/xx-SP-O2,
        2) Greystone TE200AS-xx-BS,
        3) or approved equal

8. Programmable BACnet thermostats (with ability to connect to BACnet network)
    a. In lieu of having a separate remote temperature sensor driving a native BACnet controller, one may combine the sensor and controller components into one thermostat. This shall be used for fan coil units, cabinet unit heaters.
    b. BACnet thermostats shall have integral temperature sensor with LCD and set point adjustments of +3ºF. Schedule via central BACnet scheduler.
    c. Thermostat shall be powered from 24VAC. Thermostat shall provide BACnet Standard Objects for Space Comfort Controller. Thermostat shall be able to provide peer to peer communication and shall utilize the BACnet protocol.
    d. Power: Nominal 24 VAC, 60 Hz.
    e. Operating Temperature: 32ºF to 122ºF
    f. Display Range: -40ºF to 122ºF
    g. Transceiver for MS/TP network: RS-485; 38.4 kbps
    h. LCD: 2 rows – 8 characters each
    i. Resolution: +/- 0.2ºF
    j. Control Accuracy: +/- 0.9ºF at 70ºF (calibrated)
    k. Sensor Range: Heating: 40ºF to 90ºF
    l. Sensor Range: Cooling: 54ºF to 100ºF
    m. Provide local programmable occupied/unoccupied override adjustment.
    n. Acceptable Manufacturers and Model Numbers
        1) Distech: EC-Stat
        2) Viconics: VT7200 or VT7600 depending on application
        3) Johnson TEC22xx
        4) Or approved equal

B. Differential Pressure Transmitters and Accessories

1. General Air and Water Pressure Transmitter Requirements:
    a. Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage and to hold calibrated accuracy when subject to a momentary 40% over-range input.
    b. Pressure transmitters shall provide the option to transmit a 0 to 5VDC, 0 to 10VDC, or 4 to 20 mA output signal.
    c. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device and shall be supplied with shutoff and bleed valves in the high and low sensing pick-up lines (two way or 3-way valve manifolds as applicable).
    d. Provide the transmitter with a NEMA rating suitable for its installed location. Locate transmitters in accessible local control panels wherever possible.
    e. Duct sensing pressure applications where the velocity exceeds 1500 fpm shall utilize static pressure traverse probes.

2. Low Air Pressure Applications (0 to 0.5-inch WC)
   a. The pressure transmitter shall be capable of transmitting a linear electronic signal proportional to the differential of the room and reference static pressure input signals with the following minimum performance specifications.
      1) Span: Not greater than two times the design differential pressure.
      2) Accuracy: Plus or minus 0.5% of F.S.
      3) Dead Band: Less than 0.3% of output.
      4) Repeatability: Within 0.2% of output.
      5) Linearity: Plus or minus 0.2% of span.
      6) Response: Less than one second for full span input.
      7) Temperature Stability: Output < 0.01%/□F shift.
      8) Pressure transmitters shall transmit a 0 to 5VDC, 0 to 10VDC, or 4 to 20 mA output signals.
      9) The transmitter shall utilize variable capacitance sensor technology and be immune to shock and vibration.
   b. Acceptable Manufacturers and Model Numbers
      1) Veris Industries PX series
      2) Setra Model 260
      3) Ashcroft CXLDP
      4) Dwyer Series MS
      5) Or approved equal

C. Damper Actuators

1. Outside Air (OA) and Exhaust Air (EXH) actuators shall be modulating, spring-return, normally-closed for fail-safe operation.

2. The control circuit shall be fully modulating using 0-10VDC or 4-20mA signals. Accuracy and repeatability shall be within ±1/21 of control signal. A 0-10VDC or 4-20mA signal shall be produced by the actuator that is directly proportional to the shaft clamp position which can be used to control actuators which are paralleled off a master motor or to provide a feedback signal to the automation system indicating damper position. Accuracy shall be within ±2.5%.

3. Face and bypass dampers and other control dampers shall be modulated using the same control circuit detailed above but shall not be spring-return.

4. Acceptable manufacturers:
   a. Belimo
   b. Siemens
   c. Dodge
   d. Delta.
   e. Or approved equal

D. Valve Actuators

1. Control Valves Actuators (3 inch and smaller)
   a. Actuators shall have a gear release button on all non-spring return models to allow manual setting. Pipes shall be fully insulated and heat shields shall be installed if necessary.
   b. The control circuit shall be on/off using 24VAC signals or fully modulating using 0-10 volt or 4-20 mA signals. Accuracy and repeatability shall be within 1/21 of control signal. A 0-10VDC or 4-20mA feedback signal shall be produced by the actuator which is directly proportional to the shaft clamp position which can be used to control actuators which are paralleled off a master motor or to provide a feedback signal to the automation system indicating valve position.
   c. Valve body and actuators shall be shipped fully assembled and tested at the valve factory prior to shipment.

   d. Acceptable manufacturers:
      1) Belimo
      2) Siemens
      3) Dodge
      4) Delta.
      5) Or approved equal

E. Carbon Dioxide Sensor

1. Redundant CO2 sensors shall be provided at each location installed.

2. Sensor quality:
   a. Error not to exceed 50 parts per million (ppm) in expected range of measurement.
   b. Drift not to exceed 20 ppm.

3. Sensor used for demand-controlled ventilation shall be Kele Vaisala GMW21 or GMD20 Series; or AirTest Model TR9294 (wall mount), or AirTest Model TR9294-BAC (wall mount), or Veris Industries C series, or Greystone Model CCD.

2.6 SWITCHES

A. Differential Pressure Switches

1. All pressure sensing elements shall be corrosion resistant. Pressure sensing elements shall be bourdon tubes, bellows, or diaphragm type. Units shall have tamper-proof adjustable range and differential pressure settings.

2. Unit shall be provided with indicating 4” Magnehelic gauge (or approved equal). Two pressure sensor snap-acting, dry-contact micro-switches shall be provided that shall be rated up to 10A @ 120VAC, 60 Hz. Sensor assembly

shall operate automatically with manual reset, one required for each circuit. Complete sensor assembly shall be protected against vibration at all critical movement pivots, slides, etc. Unit shall have 2% full-scale accuracy at 70°F and shall be UL approved.

3. Unit shall be rated for 10-inch Hg to 25 psig total overpressure on either side of the diaphragm.

4. Ambient temperature: 20°F to 120°F.

5. Acceptable Manufacturers: Dwyer Photohelic A3000 Series or approved equal.

B. Electric Low-Limit Thermostat (Freezestat)

1. Duct-type, fixed-differential, temperature range of 5.0°F. Sensing element shall be a 20-foot long capillary tube responding to the lowest temperature sensed along any segment (typically between two and twelve inches) of bulb length. Hardwired contacts shall be provided. One NC-SPST rated for 16A @ 120VAC, 9.2A @ 208VAC; 8A @ 240VAC, and one NO-SPST rated for 6A @ 120VAC, 3.3A @ 208VAC; 3A @ 240VAC. Provide one low limit thermostat for each twenty (20) square-feet or fraction thereof of coil surface area.

2. The NC-SPST contact shall be hardwired into the supply fan motor control circuit and shall not be wired in the auto-leg of the HOA switch. The NO-SPST contact shall be wired into the DDC controller as a digital input.

3. Provide hardwired interlocked automatic-reset type thermostat set at 35°F on each air handling unit, with an adjustable (0 to 120 second) time delay before the fan shuts down. Provide a pushbutton switch at the unit control panel in order to reset the freezestat when tripped.

4. Provide an override of this safety-shutdown for air handling units requiring smoke-purge initiation from the Fire Alarm System. Coordinate override with Fire Alarm Contractor.

5. Acceptable Manufacturers
   a. Dynacon FS-53
   b. Kele A70GA-1
   c. Siemens 134-1510
   d. Or approved equal

C. Water Flow Switches

1. UL-listed, suitable for all service application conditions. Body minimum working pressure rating shall equal or exceed service pressure. Switch electrical rating shall be 230 volts AC 3.7 ampere, 115 volts AC 7.4 ampere, and 125 VAC 115-230 VAC Pilot duty. Unit shall have two SPDT switches. Actuating flow rated shall be field adjustable for the specified and indicated service. Switch location shall preclude exposure to turbulent or pulsating flow conditions. Flow switch shall not cause pressure drop exceeding 2 psi at maximum system flow rate. Manufacturer: McDonnell-Miller FS7-4 or Ameritrol, Inc. FX series or Dwyer Model FS-2 Series or Kele F61 Series or approved equal

D. Strap-On Aquastat

1. UL-listed, provided with a suitable removable spring-clip for attaching aquastat to pipe and a snap-action SPDT switch. Switch adjustable set point shall be as indicated. Electrical rating shall be 5 Amps, 120 VAC.

2. Acceptable Manufacturers
   a. Honeywell L4006H1004
   b. JCI A19DAC-1C
   c. or approved equal.

2.7 AIR FLOW MEASURING STATION (AMS)

A. Each measurement device shall consist of one or more sensor probe assemblies and a single microprocessor-based transmitter. Each sensor probe assembly will contain one or more independently wired sensor housings. Multiple independent sensors shall produce measurements equally weighted and averaged by the transmitter prior to output. Pitot tubes and arrays are not acceptable. Vortex shedding airflow meters are not acceptable.

B. Each sensor housing shall utilize two hermetically sealed, bead-in-glass type thermistor probes used to determine airflow rate and ambient temperature. Devices that use “chip” type thermistors are unacceptable. Devices that do not have two thermistors in each independent sensor-housing are not acceptable.

C. Each independent sensor-housing shall be calibrated at a minimum of sixteen (16) airflow rates and have an accuracy of ±2% of reading over the entire operating airflow range. Each sensor assembly shall be factory calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).

D. Devices whose accuracy is the combined accuracy of the transmitter and sensor probes must demonstrate that the total accuracy meets the performance requirements of this specification throughout the measurement range.

E. The operating temperature range for the sensor probe assembly shall be -20°F to 160°F. The operating humidity range for the sensor probe assembly shall be 0-99% RH (non-condensing).

F. Each temperature sensor shall be calibrated at a minimum of three temperatures and have an accuracy of ±0.15°F over the entire operating temperature range. Each temperature sensor shall be factory calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).

G. Each sensor probe assembly shall have an integral, U.L. listed, plenum rated cable and terminal plug for connection to a remotely mounted transmitter. All interconnecting pins shall be gold plated.

H. Each sensor assembly shall not require matching to the transmitter in the field.

I. A single manufacturer shall provide both the airflow/temperature measuring probe(s) and transmitter at a given measurement location.

J. The number of sensor housings provided for each location shall be as follows:

Area (sq.ft.)	Sensors
<=1	2
>1 to <4	4
4 to <8	6
8 to <12	8
12 to <16	12
>16	16

K. Probe assembly mounting brackets shall be constructed of stainless steel. Probe assemblies shall be mounted using one of the following options:

1. Insertion mounted (through the side or top of the duct)

2. Internally mounted (inside the duct or plenum)

3. Standoff mounted (inside the plenum, immediately upstream of an intake damper or downstream of a filter or coil bank.)

4. The operating airflow range shall be 0 to 5,000 FPM unless otherwise indicated on the plans.

L. Airflow with Integral Temperature Transmitters

1. The transmitters shall have an LCD display capable of displaying airflow and temperature. Airflow shall be field configurable to be displayed as a velocity or a volumetric rate.

2. The transmitter shall be capable of displaying the individual airflow and temperature readings of each sensor on the LCD display.

3. The transmitter shall operate on 24 VAC or 24 VDC. The transmitter shall not require an isolated power source.

4. The operating temperature range for the transmitter shall be -20°F to 120°F. The transmitter shall be protected from weather and water.

5. The transmitter shall be capable of communicating with the host controls using one of the following interface options:
   a. Linear analog output signal: Field selectable, fuse protected and isolated, 0-10 VDC and 4-20mA (4-wire)

6. The airflow/temperature measuring device shall be UL listed as an entire assembly.

7. The manufacturer's authorized representative shall review and approve placement and operating airflow rates for each measurement location indicated on the ATC shop drawings. A written report shall be submitted to the EOR if any measurement locations do not meet the manufacturer's placement requirements.

8. Acceptable Manufacturers
   a. Ebtron Series GP1 Duct and Plenum Probe
   b. Air Monitor (AMC) Electra-flo Ultra Series
   c. Or approved equal

M. Current Sensing Switches

1. Current sensing switches shall consist of a solid-state current sensing circuit, adjustable trip point, solid state switch, SPDT relay and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip into range.

2. Acceptable Manufacturers
   a. Kele Model SCS1 series
   b. Greystone SC-500 series
   c. Veris Industries H908
   d. Dwyer Series SCS

2.8 CONTROL VALVES

A. General Control Valve Requirements:

1. All automatic control valves shall be linear, fully proportioning, either two-position or modulating ball, plug or V-port inner guides unless otherwise specified. The valves shall be quiet in operation and fail safe in either normally open or normally closed position in the event of control air failure or loss of electronic low voltage power.

2. All valves shall be capable of operating in sequence when required by the sequence of operation. All control valves shall be sized by the ATC Contractor, and shall be guaranteed to meet the heating and cooling loads as specified. Valve authority (i.e., ratio of open valve pressure drop to closed valve pressure drop) shall be greater-than or equal-to 0.5 for throttling valve applications. The pressure drop through the control valve when it is fully open shall be at least 50% of the pressure drop from the supply to the return line.

3. All control valves shall be suitable for the pressure conditions, and shall close against the differential pressures involved. Valve body pressure rating and connection type (screwed or flanged) shall conform to ANSI pressure classifications appropriate for the system working pressures.

4. All control valve actuators installed outdoors shall be rated for the ambient conditions and shall be NEMA 4x.

B. Hot and Cold Water Control Valves

1. Hot and cold water globe type control valves shall be single-seated type, with equal percentage flow characteristics. The valve discs shall be composition type and shall be sized using ISA methods.

2. Pressure drop through the valves shall not exceed 5 psig unless otherwise indicated.

3. Hot and cold water ball type control valves shall be equipped with 316 stainless steel trim, Teflon seals and adjustable packing gland nuts. Provide a handle for manual operation during start-up and maintenance.

2.9 PANELS AND ENCLOSURES

A. DDC Control Panels

1. For all input/output devices/controllers that require field interface devices, these devices where practical shall be mounted in a field DDC Control panel. All other field interface devices shall be mounted at the point of field interface in a separate enclosure suitable for the location. The ATC Contractor shall provide an enclosure that protects the device(s) from dust, moisture, conceals integral wiring and moving parts. DDC control panels shall contain power supplies for sensors, interface relays and contactors, safety circuits, and I/P transducers.

2. The DDC control panel enclosure shall be of steel construction with baked enamel finish; NEMA 1 rated for indoor applications with a hinged door and keyed lock. The enclosure shall be sized for twenty percent spare mounting space. All locks shall be keyed identically. All controller enclosures installed outdoors shall be rated for the ambient conditions and shall be NEMA 4X.

3. All wiring to and from the DDC control panel shall be to screw type terminals. Analog or communications wiring may use the panel as a raceway without terminating. The use of wire nuts within the panel or on any DDC Controller input or output wiring is prohibited.

4. All wiring within the panel shall be run in plastic wire way to give a neat and workmanlike appearance.

B. Room Thermostat Enclosure

1. Clear plastic construction.

2. Include guard cover, tamper-resistant tumbler lock, two keys.

3. Guard base vents to allow airflow for optimum thermostat performance.

4. Acceptable Manufacturers
   a. Honeywell
   b. Or approved equal.

2.10 DDC HARDWARE IDENTIFICATION

A. Automatic Control Valve Tags

1. Refer to Section 23 05 53, Identification for HVAC Piping and Equipment.

B. Wire Tags

1. All conductors or cables in all pull boxes, control panels, devices and terminal strip cabinets shall be tagged.

2. Provide wire Tags as per Division 26.

C. Conduit Tags

1. Provide tagging or labeling of conduit so that it is always readily observable which conduit was installed or used in implementation of this Work.

D. Miscellaneous Equipment Identification

1. Screwed-on, engraved black Lamicoid sheet with white lettering on all control panels and remote processing panels. Lettering sizes subject to approval.

2. Inscription, subject to review and acceptance, indicating equipment, system numbers, functions and switches. For panel interior wiring, input/output modules, local control panel device identification.

3. All I/O field devices (except space sensors) that are not mounted within the controller panel shall be identified with name plates.

4. All I/O field devices inside the controller panel shall be labeled.

5. The identification shall match all documentation and identify the function (i.e., mixed air temperature sensor).

6. Calibration settings shall be clearly marked with paint or indelible ink. Each terminal strip termination shall be tagged with an identification that matches the control drawings.

7. The outside of each DDC controller panel shall be identified with a phenolic label with black lettering on white background, matching the identification name shown on the drawings.

8. All wiring and cabling, including that within factory-fabricated panels shall be labeled at each end within 2" of termination with a cable identifier and other descriptive information.

9. Permanently label or code each point of field terminal strips to show the instrument or item served.

E. Identify all other control components with permanent labels. Identifiers shall match record documents. All plug-in components shall be labeled such that removal of the component does not remove the label. Identify all equipment and panels. Identification shall be with labels describing equipment and panel use function.

F. All wires and cables shall be identified with permanent markers or wire tag at controller. Wire designations at controllers shall describe the device termination point and function. Also provide control wiring diagram within terminal controller enclosure. Label all input and output field devices as labeled on control diagram.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General requirements

1. The installation of the control system shall be made by the manufacturer or approved franchised dealers.

2. Install the complete DDC systems of temperature control, as noted on the Drawings and as specified. Provide all necessary relays, mounting brackets, switches, digital controllers, control wiring and accessories required, even though not specifically called for, so as to result in complete workable systems.

3. Install all control components in accordance with manufacturer's instructions and recommendations.

4. Mount control panels adjacent to associated equipment on vibration-free walls or freestanding angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved Lamicoid nameplates on cabinet face.

5. After completion of installation, test and adjust control equipment. Submit data showing calibration, set points and final adjustments of controls.

6. Install equipment, piping, wiring, cable trays, etc. parallel to building lines (i.e., horizontal, vertical, and parallel to walls) wherever possible.

7. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.

8. Install all equipment in readily accessible location as defined by the NEC or by NYS Code.

9. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.

10. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

B. Sensor Installation

1. Temperature and humidity sensors and thermostats shall require no field calibrations.

2. Temperature and humidity sensor and thermostats assemblies shall be readily accessible and adaptable to each type of application in such manner as to allow for quick, easy replacement and servicing without special tools or skills.

3. Temperature sensor strap-on mountings, utilizing helical screw stainless steel clamps, shall only be permitted on hot water piping up to 2 inches. All other water temperature sensors shall be in wells.

4. All outdoor applications shall utilize NEMA 4x enclosures. These installations shall be protected from solar radiation and wind effects. Protective shield shall be stainless steel.

5. Thermostats shall be provided with guards.

6. All sensor and thermostat guard depth dimensions shall not exceed 4” per ADA requirements.

7. Sensors in ducts shall be mounted in locations to sense the correct temperature and/or humidity of the air only and shall not be located in dead air spaces or positions obstructed by ducts, equipment, and so forth. Locations where installed shall be within the vibration and velocity limit of the sensing element. Ducts shall be securely sealed where elements or connections penetrate ducts to avoid measuring false conditions.

8. All sensors measuring temperatures in pipes larger than 2 inches in diameter or in pressure vessels shall be supplied with wells properly fabricated for the service. Wells shall be non-corrosive to the medium being measured and shall have sufficient physical strength to withstand pressures and velocities to which they are subjected. Wells shall be installed in the piping at elbows where piping is smaller than the length of the well to affect proper flow across the entire area of the well.

9. Thermo-well-mounted sensors shall include thermal conducting compound to ensure good heat transfer to the sensor.

10. Space carbon dioxide sensors shall take measurements (readings) in each space at intervals not to exceed 1 minute.

C. Actuator Installation

1. Mount and link control damper actuators per manufacturer's instructions.

2. To compress seals when spring return actuators are used on normally closed dampers, power actuator to approximately 5 degrees open position, manually close the damper, and then tighten the linkage.

3. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.

4. Valves - Actuators shall be mounted on valves with adapters approved by the actuator manufacturer. Actuators and adapters shall be mounted following manufacturer's recommendations.

D. Control Valve Installation

1. Valve submittals shall be coordinated for type, quantity, size, and piping configuration to ensure compatibility with pipe design. The equipment manufacturer or the mechanical field contractor shall install all valves.

2. All control valves shall be installed so that the stem position is not more than 60 degrees from the vertical up position or as directed by the valve manufacturer, whichever is the most limiting.

3. Valves shall be installed in accordance with the manufacturer's recommendations.

4. Control valves shall be installed so that they are accessible and serviceable, and such that actuators may be serviced and removed without interference from structure or other pipes and/or equipment.

5. Isolation valves shall be installed such that control valve body may be serviced without draining the supply/return side piping system. Unions shall be installed at all connections to screwed type control valves.

6. Provide tags for all control valves indicating service and number.

E. Control Damper Installation

1. Dampers are field furnished by ATC contractor and installed by mechanical contractor. Article does not apply to factory furnished equipment.

2. Damper submittals shall be coordinated for type, quantity, and size to ensure compatibility with sheet metal design.

3. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure 1/4" larger than damper dimensions and shall be square, straight, and level.

4. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be equal +-1/8".

5. Mechanical contractor shall follow manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.

6. Mechanical contractor shall install extended shaft or jackshaft per manufacturer's instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)

7. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to assure proper operation. On multiple section assemblies, all sections must open and close simultaneously.

8. Provide a visible and accessible indication of damper position on the drive shaft end. The orientation of the blades shall be indicated by the Mechanical Contractor by notching the end of the damper shaft in the direction of the blades.

9. Mechanical contractor shall support ductwork in area of damper when required to prevent sagging due to damper weight.

10. After installation of low-leakage dampers with seals, mechanical contractor shall caulk between frame and duct or opening to prevent leakage around perimeter of damper.

F. Location

1. Sensor location(s) must avoid impact of doorways, windows, short circuiting, and supply air vents.

2. Space sensors shall be mounted away from machinery generating heat, direct light, and diffuser air streams.

3. Space carbon dioxide sensors must be located at points that are reflective of the breathing zone of each space served.

4. An adequate number of space carbon dioxide sensors must be provided for each space.

5. Redundant CO2 sensors shall be provided at each location installed. If the difference in reading between sensors at the same location exceeds ten percent (10%), both sensors will require calibration.

6. Outdoor air sensors shall be mounted on the building's north face directly in the outside air. Install these sensors such that the effect of heat radiated from the building or sunlight is minimized. Install the outside air humidity and CO2 sensors adjacent to the outside air temperature sensor. All outdoor applications shall utilize NEMA 4x enclosures.

7. Field enclosures shall be located immediately adjacent to the controller panel to which it is being interfaced.

3.2 PROTECTION

A. The ATC Contractor shall protect all work and material from damage by his/her work or workers, and shall be liable for all damage thus caused.

B. The ATC Contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted by the EOR. The ATC Contractor shall protect his/her work against theft or damage, and shall carefully store material and equipment received on-site that is not immediately installed. The ATC Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.3 START-UP POINT-TO-POINT AND BASIC FUNCTIONAL TESTING

A. Upon completion of component or system installation, the ATC Contractor shall initiate comprehensive point-to-point and basic functional testing. Factory calibration and bench testing will not be considered acceptable alternates to onsite field testing.

B. Start-up/Point-to-Point Scope

1. Test all end field devices through proper input/output to BMS fron-end.

2. Testing must be complete, detailed and documented on approved point-to-point verification forms.

3. All field calibration must be done with high quality instrumentation. Test instrumentation selected for calibrating field devices shall be suitable for application. Instruments shall display current (within the past 12-months) NIST traceable calibration sticker. Associated instrument calibration certificates shall be made available within 24 hours of request for copy.

4. Provide testing and documentation criteria.
   a. Field device and functionality
      1) Verify all field devices installed are properly sized or ranged for anticipated operating range. Verify devices are adjusted for correct position, orientation and full range.
   b. Conductor Integrity
      1) Test all wiring continuity from field devices to correct input/output.
   c. Conductor Termination
      1) Verify all device wire terminations are per submittal package.
      2) Verify all input/output wire terminations are correct.
      3) Verify field devices communicate to the BMS front-end.
   d. Conductor to Output
      1) Test linear-scaling calibration of every analog output point.
   e. Device Calibration
      1) All field devices are to be field calibrated. All thermistor sensors shall be tested for accuracy in the field or at the factory prior to shipment (when integral with NIST traceable calibration).
   f. Calibration must be done at or close to normal operating conditions.
   g. Field Calibration Criteria

Space Temperature	± 1°F
Air Temperature–Unitary	± 1°F
Fluid Temperature	± 1°F
Air Flow Rate	± 5%
Liquid Flow Rate	± 5%
Differential Pressure	± 3%
Gage Pressure	± 5%
Relative Humidity	± 2%
CO_2 Monitor	± 5% mid-range

5. The ATC Contractor shall completely check out, calibrate, and test all connected hardware and ATC CONTRACTOR supplied software to ensure that the system performs in accordance with the approved specifications and sequences of operation submitted. The Authority's Project Officer and FMSI shall witness all testing performed by the ATC Contractor.

6. The ATC Contractor shall be responsible for all testing, repair, and retesting as outlined in this specification.

7. Complete records shall be kept of all tests and test reports. Records shall be made available to the Project Officer and FMSI personnel for inspection and approval. Records shall be turned over to the Authority at the end of the work phase.

8. The ATC Contractor shall notify the EOR and Owner's representative (5) days prior to testing in order that representatives may witness such tests.

9. Demonstrate to the EOR and Owner's representative approved operation and acceptance testing of the complete system.

10. Field Test: When installation of the system is complete, calibrate equipment and verify transmission media operation before the system is placed on-line. All testing, calibrating, adjusting and final field tests shall be completed by the ATC Contractor. Provide a crosscheck of each control point within the system by making a comparison between the control command and the field-controlled device. Verify that all systems are operable from local controls in the specified failure mode upon panel failure or loss of power or loss of network. Submit the results of functional and diagnostic tests and calibrations to the EOR and Owner's representative for final system acceptance.

11. Comprehensive functional performance testing shall be performed on every installation or modification to the control system. The ATC Contractor shall test and document all logic and control sequence statements for accomplishing each specific control function as detailed in the approved sequence of operation. The ATC Contractor shall record each process and corresponding results. Documentation will include names of test personnel and final test dates.

12. Demonstrate the complete system to the EOR and Owner's representative to verify compliance with the project specifications. Failure to comply with the specified information shall constitute non-performance of the contract. The ATC Contractor shall submit written justification for each item that he is unable to comply with.

3.4 ELECTRICAL WORK

A. Division 26 Electrical Contractor to provide power supply wiring from power source to power connection at unit control panels including starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer. ATC Contractor to provide control wiring as required and necessary for a complete operation. Interlock wiring between electrically operated equipment and between equipment and field-installed control devices shall be provided by the ATC Contractor.

1. Control Wiring
    a. Install control signal and control power wiring without splices between terminal points. Install in neat workmanlike manner, securely fastened. Install raceways, boxes, cabinets, electronic, building wire, cables, and signal cable in accordance with National Electrical Code and the requirements of Division 26.

3.5 INSPECTION

A. Verify that systems are ready to receive work.

B. Beginning of installation means installer accepts existing conditions.

C. The project plans shall be thoroughly examined for control device and equipment locations, and any discrepancies, conflicts, or omissions shall be reported to the EOR for resolution before rough-in work is started.

D. The ATC Contractor shall inspect the site to verify that equipment is installable as shown, and any discrepancies, conflicts, or omissions shall be reported to the EOR for resolution before rough-in work is started.

E. The ATC Contractor shall examine the drawings and specifications for other parts of the work, and if head room or space conditions appear inadequate or if any discrepancies occur between the plans and his work and the plans for the work of others, he shall report such discrepancies to the Authority and shall obtain written instructions for any changes necessary to accommodate his work with the work of others.

3.6 TRAINING

A. The ATC Contractor shall provide competent instructors to give full instruction (minimum 40 hours) utilizing specified manuals, as-built documentation and the on-line help utility to designated personnel (Custodian / Owner's Maintenance Representative) in the adjustment, operation and maintenance of the equipment installed rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. ATC Contractor shall submit training program with submittal for the EOR approval.

1. Operator Training
    a. Instruct Owner's operating personnel in proper starting sequences, operation, shut down, and maintenance procedures, including normal and emergency procedures.
    b. Instruct Owner's operating personnel in proper use of system scheduling procedures.
    c. Instruction shall be by personnel skilled in operation of equipment. Instruction for major equipment shall be by equipment manufacturer's representatives.
    d. Reference instructions contained in the Operating and Maintenance Manuals. Instructions cannot be substituted for manuals.
    e. Provide equipment and materials required for classroom training.
    f. All training performed shall reference site-specific installation examples whenever possible. Training shall utilize the approved O&M manuals, as-built documentation, and the on-line help utilities
    g. Operator training shall include:
        1) Sequence of Operation review
        2) Download and initialization of DDC controllers
        3) Troubleshooting of sensors (determining bad sensors)

3.7 SEQUENCES OF OPERATION

A. General Requirements

1. Units providing cooling and heating shall be configured/programmed to prevent the heating setpoint from exceeding the cooling setpoint and to maintain a deadband of not less than 5°F (2.8°C).

2. Programmable controls shall be capable of starting and stopping the system for seven different daily schedules per week and retaining their programming and time setting during a loss of power for not fewer than 10 hours. Additionally, the controls shall have a manual override that allows temporary operation of the system for up to 2 hours; a manually operated timer configured to operate the system for up to 2 hours; or an occupancy sensor.

3. Programmable controls shall be configured to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85°F (29°C).

4. Automatic start controls shall be provided for each HVAC system. The controls shall be configured to automatically adjust the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy.

5. Record keeping (CO_2 concentration readings for systems using Demand Control Ventilation): Records to be provided to School District's Health and Safety Committee.
    a. CO_2 concentration readings from all sensors serving each space must be recorded at not greater than 15-minute intervals. Records of CO_2 concentrations must be kept for a minimum of three years.

6. SPLIT HEAT PUMP AIR CONDITIONING SYSTEM

7. FOLLOW STANDARD BASIS OF DESING OEM SEQUENCE OF OPERATION.

8. RUN CONDITIONS – SCHEDULED.

B. EXHAUST FANS

RUN CONDITIONS - SCHEDULED:
THE FAN(S) SHALL RUN ACCORDING TO A USER DEFINABLE SCHEDULE (SCHOOL HOURS)

FAN:
THE FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME.

EXHAUST AIR DAMPER:
THE EXHAUST AIR DAMPER SHALL OPEN ANYTIME THE UNIT RUNS AND SHALL CLOSE ANYTIME THE UNIT STOPS. THE EXHAUST AIR DAMPER SHALL CLOSE 30 SEC (ADJ.) AFTER THE FAN STOPS.

FAN STATUS:
THE CONTROLLER SHALL MONITOR THE FAN STATUS.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
FAN RUNTIME EXCEEDED: FAN STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

C. ELECTRIC CABINET UNIT HEATER - VESTIBULE

RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

OCCUPIED MODE: THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 60°F (ADJ.). THERMOSTAT CONFIGURED TO SHUTOFF THE UNIT WHEN OUTDOOR TEMPERATURE IS ABOVE 45F.
UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 55°F (ADJ.). THERMOSTAT CONFIGURED TO SHUTOFF THE UNIT WHEN OUTDOOR TEMPERATURE IS ABOVE 45F.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

ZONE SETPOINT ADJUST:
THE OCCUPANT SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR.

ZONE OPTIMAL START:
THE UNIT SHALL USE AN OPTIMAL START ALGORITHM FOR MORNING START-UP. THIS ALGORITHM SHALL MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD.

ZONE UNOCCUPIED OVERRIDE:
A TIMED LOCAL OVERRIDE CONTROL SHALL ALLOW AN OCCUPANT TO OVERRIDE THE SCHEDULE AND PLACE THE UNIT INTO AN OCCUPIED MODE FOR AN ADJUSTABLE PERIOD OF TIME. AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT SHALL AUTOMATICALLY RETURN TO THE SCHEDULE.
THE FAN SHALL RUN ANYTIME THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT, UNLESS SHUTDOWN ON SAFETIES.

CABINET UNIT HEATER STAGING:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND COMMAND THE CABINET UNIT HEATER ON (UNLESS SHUTDOWN ON SAFETIES) TO MAINTAIN ITS HEATING SETPOINT. TO PREVENT SHORT CYCLING, THE STAGE SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME.
THE UNIT SHALL BE ENABLED WHENEVER:
- THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT.

D. ELECTRIC UNIT HEATERS – BUS GARAGE, BUS MAINTENANCE AREA

RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

OCCUPIED MODE: THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF BUS GARAGE - 50°F (ADJ.); BUS MAINTENANCE - 60°F (ADJ.).
UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN A BUS GARAGE - 45°F (ADJ.); BUS MAINTENANCE - 55°F (ADJ.).

ALARMS SHALL BE PROVIDED AS FOLLOWS:
LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

ZONE SETPOINT ADJUST:
THE OCCUPANT SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR.

ZONE OPTIMAL START:
THE UNIT SHALL USE AN OPTIMAL START ALGORITHM FOR MORNING START-UP. THIS ALGORITHM SHALL MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD.

ZONE UNOCCUPIED OVERRIDE:
A TIMED LOCAL OVERRIDE CONTROL SHALL ALLOW AN OCCUPANT TO

OVERRIDE THE SCHEDULE AND PLACE THE UNIT INTO AN OCCUPIED MODE FOR AN ADJUSTABLE PERIOD OF TIME. AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT SHALL AUTOMATICALLY RETURN TO THE SCHEDULE.
THE FAN SHALL RUN ANYTIME THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT, UNLESS SHUTDOWN ON SAFETIES.

STAGING:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND COMMAND THE UNIT HEATER ON (UNLESS SHUTDOWN ON SAFETIES) TO MAINTAIN ITS HEATING SETPOINT. TO PREVENT SHORT CYCLING, THE STAGE SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME.
THE UNIT SHALL BE ENABLED WHENEVER:
- THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT.

3.8 ADJUSTING

A. Adjust the DDCS for proper settings and to achieve proper control.

3.9 CLEANING

A. Thoroughly clean all equipment and accessories prior to installation and at substantial completion.

B. Remove all dirt, rust, dust, etc. from equipment and accessories.

C. Remove and dispose of all debris and waste from the Site resulting from installation.

3.10 PROTECTION OF EXECUTED WORK

A. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer that shall help ensure that the equipment is without damage at time of Substantial Completion.

END OF SECTION

SECTION 23 09 23.18

LEAK DETECTION INSTRUMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. A2L Refrigerant Leak Detection and Alarm Systems

1.2 DESCRIPTION OF WORK

A. Provide labor, materials and equipment required for the installation of a complete refrigerant leak detection system for the detection and alarming of a refrigerant leak. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

1.3 RELATED SECTIONS

A. Section 23 23 00, Refrigerant Piping

B. Section 23 09 23, Direct-Digital Control System for HVAC

C. Section 23 08 00, Commissioning of HVAC

D. Section 23 81 26, Split Heat Pump Air Conditioning System

1.4 APPLICABLE LISTINGS, CODES AND STANDARDS

A. New York State Construction Codes

B. ANSI/ASHRAE Standard 15-2022

C. ANSI/ASHRAE Standard 34-2022

1.5 SUPPLEMENTAL SUBMITTALS

A. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to leak detection and monitoring equipment. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

B. Provide a set of manufacturer’s guarantees for the refrigerant leak detection and alarm equipment as specified.

C. Calibration Equipment: Provide necessary equipment to perform required periodic calibration.

D. Maintenance Data: Maintenance Manual

E. Certificate: Contractor's start-up and demonstration affidavit

1.6 WARRANTY

A. Provide a two-year warranty. All warrantees shall use the date of Substantial Completion as the start date.

PART 2 - PRODUCTS

2.1 A2L REFRIGERANT LEAK DETECTION AND ALARM SYSTEMS

A. The Contractor shall provide a complete refrigerant leak detection and alarm system that shall monitor ambient air in the mechanical equipment room for concentrations of A2L refrigerant (R-32). The system shall continuously measure and display the concentration of A2L refrigerant at the Refrigerant Leak Detection Controller.

B. The system shall include A2L refrigerant sensors located no more than 12" above finished floor for the heavier than air A2L refrigerants mounted in locations as shown on the drawings. The refrigerant controller for remote sensors/transmitters shall be mounted in location as shown on the drawings.

C. When preset high limits of refrigerant gas are exceeded (gas concentration equaling or exceeding 25 percent of the Lower Flammability Limit (LFL) per Section BC 916.8), the system shall go into alarm status within thirty (30) seconds. The system shall provide audible and visual warning alarms at the preset low limit. At the high limit, the system shall provide audible, visual and relay outputs for dry contacts and shall simultaneously initiate the following:

1. Shutdown the condensing unit through relay output dry contact.

2. Activate the audio/visual alarms of the refrigerant controller.

3. Close automatic stop valve for all circuits of the system. Refer to drawings for locations of stop valves.

D. System Components

1. Refrigerant Leak Detection Controller
   a. Refrigerant Leak Detection Controller shall be microprocessor based with 3-digit LED display with flashing overrange and alphanumeric fault status indication and shall accept a minimum of six (6) channels. Internal audible alarm and LED's shall annunciate alarm and fault conditions. The refrigerant leak detection system continuously detects, monitors, displays and transmits concentrations of A2L refrigerant. The controller shall provide relay outputs for multiple alarm levels at pre-set limits and other functions as specified herein. Power Input: 115VAC, 50-60 HZ.

   b. Each channel designed for use with the appropriate sensor shall be mounted in the controller. High, low and trouble LEDs shall provide visual indication of alarm status, while an integral buzzer provides audible indication of alarms at the controller.
   c. When refrigerant gas concentration from the sensors exceeds the low alarm setpoint, the warning audible alarm operates and the warning light indicator associated with the alarm will be activated at the Refrigerant Leak Detection Controller and Alarm Panel. Upon further increases in the refrigerant gas concentration, the high alarm light, audible alarm and all external indicating devices associated with that alarm shall be activated.
   d. The Refrigerant Leak Detection Controller shall power each individual sensor and control the following external device loads through relay output dry contacts:

Load	Relay Action on Alarm
Multi-Channel Controller Alarm	Close
Condensing Unit Equipment Controls	Open
Automatic Refrigerant Shut-Off Solenoid Valves	Open
Fire Alarm Control Panel Dry Contacts	Close

   e. The Refrigerant Leak Detection Controller shall not power any equipment directly. The Refrigerant Leak Detection Controller shall be equipped with integral relays and integral dry contacts for all externally controlled device loads.
   f. All alarms shall be factory set to the listed standards as noted in ASHRAE 15-2022.

g. Enclosure Type: The enclosure shall be NEMA rated for the environment where the Refrigerant Leak Detection Controller will reside with front facing channels. Lockable latch mounting brackets for the purpose of attaching the unit to a flat surface shall be provided. The enclosure shall also contain:
   1) Horn to indicate low alarm, high alarm or malfunction, silenced by an acknowledge pushbutton on the cover. Horn shall have a UL reverberant high-volume setting (at 24 VDC) of 80 dB (A) at a measuring station 12" away from horn. Horn shall have an adjustable Hi-Lo dB setting and shall be the equal of Wheelock.
   2) A pilot push to test light to indicate each alarm. The light shall flash until acknowledged and remain lighted until reset.
   3) A push to test malfunction light to operate as per 2 above.
   4) Power supplies for all channels, alarm panels and equipment controls.
   5) Mounting racks and all the required channels.

2. Sensors
   a. A2L Refrigerant: Sensors shall be IR type. Temperature range shall be +32°F to + 104°F with a less than thirty (30) second response time when exposed to a 25% LFL of refrigerant gas. Each unit shall be contained within a flush mounted housing. Calibration shall be conducted at least every one hundred eighty (180) days. Warranty shall be two years with a two-year minimum life.
   b. The Mechanical Contractor shall wire the sensors to the controller with shielded cables specified by the equipment manufacturer to certify length and maximum loop resistance as required.

3. Manufacturer: The products herein described are as manufactured by:
   a. Critical Environment Technologies Model cGas-SC Self-Contained Controller with Gas Transmitter for A2L refrigerants.

4. Calibration Equipment: Equipment furnished shall be turned over to the Owner during training. Provide spare test gas in quantities sufficient to perform routine recalibration for two years.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Approved wiring diagrams and installation instruction shall be obtained from the manufacturer and followed in the installation of the leak detection/alarm equipment.

B. Electric Work

1. Mechanical Contractor to provide at a minimum, control wiring connections from each sensor and annunciator to control cabinet and accessories to make system fully operational. Equipment shall be provided with terminal boxes to receive connecting conduits. The use of wire nuts in lieu of terminal boxes for the splice connections is prohibited.

2. Electrical Contractor to provide disconnecting means for the mechanical room exhaust fan. Electrical Contractor shall provide control signal wiring from the Refrigerant Leak Detection Controller dry contact outputs to mechanical room exhaust fan, MER compressors, etc.

3. Electrical wiring is under Division 26. Electrical Contractor to provide power wiring to control panels and all accessory power wiring to make system fully operational. Mechanical Contractor to provide all input control wiring to control cabinet.

4. Conduit: Wiring shall run in accordance with the NYS Electrical Code. Wiring connections between each control cabinet and the refrigerant leak detection sensors shall be in either standard conduit with oil impervious gasketed connections or in flexible oil tight conduit (Sealtite). Conduits shall be not less than 3/4" standard weight galvanized steel conduit, large enough to accommodate the wires specified. Flexible oil tight conduit (Sealtite) shall be U.L. approved. No conduit shall be installed contact with the mechanical room floor.

5. Conductors
   a. Conductors shall be copper of 98% conductivity, and free of splints, flaws, or other defects. They shall be in accordance with the NYS Electrical Code. Conductors shall be delivered in their original packages or reels, which shall be marked with the manufacturer's identification and date of manufacture.
   b. Wiring between refrigerant leak detection control cabinet and associated equipment installed shall be type THHN, 90o C, 600 volts.

3.2 INSTALLATION OF A2L REFRIGERANT LEAK DETECTION AND ALARM SYSTEMS

A. The refrigerant detection sensor shall be installed at a mounting height of 12" maximum above the finished floor or slab at the location specified for A2L heavier than air refrigerants.

B. The locations of all the sensors, detectors, control panels and all other items and accessories shall be such that access for ease of maintenance and repair shall be provided.

C. Contractor shall establish and follow a quarterly calibration schedule for the refrigerant leak monitoring system during the two (2) year warranty period. A logbook shall be kept indicating the location, calibration dates, dates of sensor replacement and all other work done to all systems. During the two (2) year warranty period of the systems, the logbook shall remain on site and be available for inspection. The logbook shall be turned over to the Owner after the expiration of the two (2) year warranty.

D. The Mechanical Contractor shall provide the refrigerant leak sensors as shown on the Drawings. Mechanical Contractor shall provide the detection and alarm panel (refrigerant controller), room detectors, audio/visual alarms, all sensors and control wiring for equipment. The Mechanical Controls Contractor shall provide all control wiring to annunciators, sensors, equipment and accessories.

3.3 FIELD QUALITY CONTROL

A. Supervisory Personnel: Provide field service personnel in the employ of the refrigerant leak detection/alarm system manufacturer for such time as required to put installed equipment into operation. Supervisory services shall include the following:

1. Training of Personnel: Approved refrigerant leak detection/alarm system manufacturer's representatives shall instruct duly authorized personnel (Custodian and Owner’s designee) in the operation and maintenance of the leak detection/alarm equipment. Provide a minimum of 4 hours of training, not to include travel time for on-site instruction of personnel. This time shall be exclusive of all pre-start-up, start-up and service call time. Provide supervisors capable of instruction, in all phases of operation and accessories.

2. Service: Provide the services of a competent field service representative to furnish service to the facility. Service must be available within 48 hours from the time of notification.

3.4 INTERDISCIPLINARY TESTS AND FUNCTIONAL PERFORMANCE TESTS

A. Interdisciplinary Pre-Start-Up and Start-Up Tests

1. The Contractor shall conduct interdisciplinary pre-start up and start up tests as per the manufacturer’s start up procedures. Contractor shall submit signed start up affidavit signed by the factory authorized service representative indicating that all of the manufacturer’s pre-start up and start up procedures have been successfully completed.

B. Functional Performance Tests

1. Contractor shall also submit signed functional performance testing affidavit signed by the factory authorized service representative indicating that all of the manufacturer's functional performance tests have been successfully completed.

3.5 COMMISSIONING OF REFRIGERANT GAS LEAK DETECTION EQUIPMENT

A. HVAC Contractor shall comply with the Commissioning Requirements of Contract Specification Section 23 08 00 for refrigerant leak detection equipment.

END OF SECTION

SECTION 23 21 13

HYDRONIC PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment, and incidentals as shown, specified and required to furnish pipes, pipe fittings, pipe specialties, and pipe supports as shown on the Drawings, and as needed for a complete and proper installation of hydronic piping. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. This section includes:

1. Hydronic piping and fittings.

2. Hydronic piping specialties.

3. Hydronic piping hangers and supports.

4. Saddles and shields.

C. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the hydronic piping.

2. Notify other Contractors in advance of the installation of hydronic piping to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before the hydronic piping.

D. Related Sections:

1. Section 23 05 29, Hangers and Supports for HVAC Piping and Equipment

2. Section 23 05 53, Identification for HVAC Piping and Equipment.

3. Section 23 07 19, HVAC Piping Insulation.

1.2 QUALITY ASSURANCE

A. Codes and Standards

1. Brazing: Certify brazing procedures, brazers, and operations in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Part QB Brazing for shop and job-site brazing of piping work or in accordance with AWS B2.2 standard for Brazing Procedure and Performance Qualification per Section MC 1203.3.1.

2. Fluid Control Institute (FCI) Compliance: Test and rate "Y" type strainers in accordance with FCI 73 1: Pressure Rating Standard for "Y" Type Strainers. Test and rate other type strainers in accordance with FCI 78-1: Pressure Rating Standard for Pipeline Strainers Other than "Y" Type.

B. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with:

1. Mark valves in accordance with MSS-25: Standard Marking System for valves, fittings, flanges and unions and all other applicable MSS Standards.

2. MSS SP-80 – Bronze Gate, Globe, Angle and Check Valves.

3. MSS SP-110 – Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

4. MSS SP-58 Pipe Hangers and Supports - Materials, Design and Manufacture

5. MSS SP-69 Pipe Hangers and Supports - Selection and Application

6. MSS SP-89 Pipe Hangers and Supports - Fabrication and Installation Practices

C. Piping shall be supported at distances not exceeding the spacing specified in MC Table 305.4 or in accordance with ANSI/MSS SP-58.

D. Comply with ANSI B31.1A, ASME Code for pressure Piping, and ASHRAE Equipment Guide.

E. New York State Construction Codes: Comply with the 2020 New York City Building Code, Mechanical Code, Fuel Gas Code, Plumbing Code and Fire Code.

1.3 SUBMITTALS

A. Product Data: Provide product data for the following:

1. Piping and Fittings.

2. Piping Specialties.

3. Hangers and Supports.

B. Shop Drawings

1. Provide shop drawings of all HVAC lines, including, but not limited to, showing all diameters, pitch, cleanouts, traps, routings, terminations, shut-off valves, vents, riser drains, etc.

C. Schedules

1. Submit schedule showing pipe or tube weight, fitting and joint type for each piping system; size, location and feature for each piping specialty, hanger and support.

2. Grooved joint coupling and fitting product submittals shall be specifically identified with the applicable manufacturer's style or series number.

D. Certifications

1. Brazing Certifications: Submit reports as required for piping work.

2. For expansion bolts installed in concrete, submit ICC certification for use in cracked concrete.

1.4 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

2. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of that Work.

3. Comply with manufacturer's recommendations for rigging of equipment.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PIPES

A. Pipe used shall be free from scale or rust. Each length of pipe shall be properly marked at the mill for proper identification with name or symbol of manufacturer. Dimensions for steel pipe shall be in accordance with the ANSI B36.10. Dimensions for red brass pipe shall be in accordance with ASTM B251.

B. Copper Tubing

1. Hard-Drawn Temper; Water tubes shall be Type L per ASTM B88

2. Copper tubing shall be manufactured by:
   a. Mueller Industries
   b. NIBCO Inc.
   c. Phelps-Dodge Copper Products Corp.
   d. Revere Copper and Brass Inc.
   e. Merit Brass Company

2.2 FITTINGS

A. Unions:

1. Unions for Use in Brass Pipe or Copper Tubing Systems, 2" and under: Cast bronze, 150 lb Class, with bronze to bronze seats; with screw, brazing or solder ends, or with adapters as required.

2. Union shall be manufactured by:
   a. Anvil International
   b. E.M. Dart Co.
   c. NIBCO Inc.
   d. Smith-Cooper International
   e. Weldbend Corporation
   f. Ward Manufacturing LLC
   g. The Viking Corporation

B. Fittings for Type "L" copper tubing

1. Fittings shall be wrought copper solder joint fittings suitable for brazing and shall be in accordance with ANSI B16.22. Type "L" fittings shall have a minimum working water pressure of 150 p.s.i.

2. Flux for brazing Type L shall be equal to "Handy Flux" and shall comply with Navy Dept. Spec. 51F 4a.

3. The silver brazing alloy for brazed Type L joints shall be similar to Handy & Harmon Sil-Fos brazing alloy having a silver content of not less than 15% and a flow point of 1300^{o}F.

4. Alternately, fittings for Type "L" copper tubing may be cast bronze threaded fittings, Class 125 working pressure, conforming to ASTM B62 and ASME B16.24.

5. Grooved end fittings for Type “L” copper tube: ASME B16.22 wrought copper or ASME B16.18 bronze casting; dimensioned grooved ends designed to accept manufacturer’s couplings.

6. Alternately, hydronic fittings may be press fittings (press fit - pressure-sealed joints) by Viega ProPress, Elkhart Xpress, NIBCO Press System, Grinnell G-Press, Merit Brass Corporation (or approved equal) up to and including 4” in diameter. O-rings: EPDM; Special Tools recommended and approved by the Manufacturer.

7. Type "L" fittings shall be manufactured by:
   a. Elkhart Products Corp.
   b. Mueller Industries
   c. NIBCO Inc.
   d. Smith-Cooper International
   e. Viega ProPress
   f. Victaulic Co.
   g. Anvil International
   h. TYCO Grinnell Mechanical Products
   i. Shurjoint Piping Products
   j. Merit Brass Company

C. Couplings: Same material and pressure rating as adjoining pipe, conforming to standards for fittings in such pipe. Use taper tapped threaded type in screwed pipe systems operating in excess of 15 psig.

2.3 PIPING SPECIALTIES

A. Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide sizes and connections that properly mate with pipe, tube and equipment connections.

B. Pipe Escutcheons

1. Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Provide pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.

2. Pipe Escutcheons for Moist Areas: For waterproof floors and areas, where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged. If exposed to view, escutcheon shall be solid type.

3. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged. If exposed to view, escutcheon shall be solid type.

4. Manufacturers
   a. Zurn Industries, Inc.
   b. McGuire Mfg. Co.

C. Dielectric Unions

1. Provide products which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion.

2. Manufacturers
   a. Mueller Industries
   b. Capitol Mfg. Co.; Div. of Harsco Corp.
   c. Eclipse, Inc.
   d. Epco Sales, Inc.
   e. Perfection Corp.

D. Pipe Sleeves: Provide pipe sleeves of one of the following. Pipe sleeve must be one of the following appropriate types and thickness as specified below unless otherwise noted in the UL firestopping assembly details in which case type and thickness shall be as indicated in the UL details.

1. Sheet-Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gauges: 3" and smaller, 20 gage minimum; 4" to 6", 16 gage; over 6", 14 gage minimum.

2. Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.

3. Iron-Pipe: Fabricate from standard weight cast-iron or ductile-iron pipe; remove burrs.

4. Plastic-Pipe: Fabricate from Schedule 80 PVC plastic pipe; remove burrs.

5. Firestop penetration materials for sealing sleeves shall be listed by Underwriters Laboratories. The materials shall be as specified in Section 078400. For pipes passing through fire-rated floor, cast-in place firestop device with Underwriters Laboratories listing, and if not listed, is permitted as an acceptable sleeve alternative to a metallic sleeve with firestopping material. The cast-in place device is a one-step firestopping process that does not require additional firestop penetration materials for sealing the sleeves. The device shall be installed where required for sleeving purposes. The cast-in place firestop device shall not be used for wall applications.

6. Materials for sealing space between each pipe and sleeve through non-rated interior walls shall consist of mineral wool and sealant.

E. Drip Pans: Fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up 21/2". Reinforce top, either by structural angles or by rolling top over 1/4" steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.

2.4 SADDLES AND SHIELDS

A. Except as otherwise indicated on the Drawings, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.

B. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.

C. Protection Shields: MSS Type 40; of length recommended by the manufacturer to prevent crushing of insulation.

D. Thermal Hanger Shields: Constructed of 360° insert of high density, 100 psi, waterproofed calcium silicate, encased in 360° sheet metal shield. Provide assembly of same thickness as adjoining insulation.

E. Manufacturers:

1. Elcen Metal Products Co.

2. Pipe Shields, Inc.

3. Value Engineered Products, Inc.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.2 PREPARATION

A. Surface Preparation:

1. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

3.3 PIPE INSTALLATION

A. Install pipes in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Align piping accurately at connections, within 1/16" misalignment tolerance. Comply with ANSI B31 Code for Pressure Piping.

B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations. Run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to 1/2" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation. All piping in finished and occupied spaces shall be concealed from view by locating piping in column enclosures, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated on the Drawings.

C. Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures unless unavoidable. Install drip pan under piping that must be run through electrical spaces. Do not run piping in stairwells or elevator equipment rooms except for systems serving those spaces.

D. In the outlet from each cooling coil condensate drain pan, provide a tee with a brass plug at one end to facilitate cleaning of drain. Additionally, provide a single "P" trap for proper operation of the unit.

E. Casing for pipe at or near floors: Where pipes at or near floors are indicated on the Drawings to be encased, pipes shall be supported, insulated, and then enclosed in a casing of No. 20-gage galvanized sheet steel.

3.4 INSTALLATION OF PIPE SYSTEM JOINTS

A. Provide joint of type indicated in each piping system.

B. Thread pipe in accordance with ASME B1.20.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than three threads exposed.

C. Solder copper tube-and-fitting joints in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner that will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.

D. Offsets in piping shall be accomplished by means of standard fittings; pipe bends shall not be used for this purpose unless shown on the Drawings.

E. Reducing Fittings: Reducing fittings shall be used where drips are required.

F. Unions shall be used in piping only adjacent to units of equipment such as pumps, heating coils, cooling coils and all other items and accessories, or in other locations where specified, where shown on the Drawings, or where written permission is granted prior to installation.

G. Mechanical Couplings Type Fittings: The use of mechanical coupling type fittings on hot, cold and dual temperature water piping in lieu of other fitting is acceptable in sizes 2" to 8" inclusive. The mechanical couplings shall be self-centering and shall engage and lock the grooved pipe and/or fittings in a positive couple while allowing for some degree of angular pipe deflection, contraction and expansion. Entire coupling installation including pipe grooving shall be performed in accordance with the manufacturer's instructions. Mechanical Products couplings together with their respective grooved end pipe fittings are acceptable.

   1. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified.

   2. Grooved end shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing.

   3. A manufacturer factory-trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools and installation of grooved piping products. Factory-trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

H. Grooved Copper coupling may be used in lieu of soldering joints on 2" and up Type L copper tubing; on water services from -30oF to +250^{o}F within the manufacturer rated working pressures. Tubing shall be roll grooved as per manufacturer.

I. Pressed Connect Fit (Pressure Seal - Press Fit) Fittings: All the connections shall be made in accordance with the manufacturer's installation instructions. Copper tubing shall be cut at right angles using displacement type cutter or fine-toothed saw. Burrs shall be removed from inside and outside of tubing to prevent cutting sealing element. Mark insertion depth according to manufacturer's insertion depth chart. Seals and grip ring shall be checked for correct fit. Only the manufacturer's sealing elements shall be used. Press fitting shall be slid onto tubing while turning slightly to the marked depth. Oils or lubricants shall not be used. Fitting connections shall be made with the tool provided by manufacturer. Manufacturer's assembly tool shall be used to perform the pressing process.

J. For locations where there is insufficient access to accommodate the pressing tool, this type of joint is not allowed. Sufficient clearance must be left around each joint to allow room for the pressing tool and jaw to be attached without interference when repairing the system in the future.

3.5 INSTALLATION OF PIPING SPECIALTIES

A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole and is flush with adjoining surface.

B. Dielectric Unions: Jints between different ferrous and non-ferrous metallic piping materials shall be made with approved dielectric fittings or brass converter fittings.

C. Pipe Sleeves

1. Install pipe sleeves where piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on the Drawings or as reviewed by the Project Architect. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves. Extend floor sleeves 1/4" above level floor finish, and 3/4" above floor finish sloped to drain.
   a. Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings.
   b. Install iron-pipe sleeves at exterior penetrations, both above and below grade.
   c. Install steel-pipe or plastic-pipe sleeves where indicated on the Drawings.

2. Sleeves for floors, walls and other masonry work shall be set in place before the slabs or walls are constructed. In buildings having floor slab of composite metal deck construction, Contractor shall be responsible for cutting holes in the steel deck. Where drilled openings are in terra cotta arch, exposed hollow core of the blocks shall be completely filled with non-shrink grout and prepacked to achieve firm bearing on the entire perimeter of the structural steel sleeve. Where corrugated sheet metal is encountered, it shall be cut by the rotary drill used to cut the arch. For location of sleeve, Contractor is to coordinate with new and existing Drawings (Structural steel beams are shown on original Drawings). Openings in arch must be located to miss existing structural steel. Openings in existing arch are to be made by rotary core drill only. Hammering of any type is not permitted. The size of the opening in arch may not exceed the requirement shown on the Details Drawings. The mix for non-shrink grout shall be in accordance with the manufacturer's recommendations. The non-shrink grout shall be compacted to provide firm bearing between the structural steel sleeve or sleeves and the existing arch. Additionally, where there are two sleeves, provide compacted non-shrink grout between the sleeves.

D. Fire Barrier Penetration Seals: refer to Section 078400 - Firestopping.

E. Drip Pans: locate drip pans under piping passing over or within 3 feet of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to side of drip pan. Brace to prevent sagging or swaying. Connect 1" drain line to drain connection and run to nearest plumbing drain or elsewhere as indicated on Drawings.

F. Insulated Piping: Comply with the following installation requirements.

1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.

2. Shields: Where low-compressive-strength insulation or vapor barriers are used, install coated protective shields.

3. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.

4. Insulation Saddle System, the equal of Anvil Fig 260 ISS can be used instead of shields and/or saddles when proper insulating techniques are employed including the use of mastic and caulk on all insulation edges and final taping. Position the pipe on the saddle, notch section of the insulation to fit around the saddle, square cut the adjoining insulation section and butt the mating end to the notched section, finish taping according to standard methods, no metal shield is required between the hanger and pipe insulation.

G. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31 and to prevent transfer of loading and stresses to connected equipment.

H. Fabricate and install anchor by welding steel shapes plates and bars to piping and to structure. Comply with AWS standards.

3.6 CLEANING, FLUSHING, INSPECTING

A. Clean exterior surfaces of superfluous materials and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items. Inspect pressure piping in accordance with procedures of ASME B31.

B. Hanger Adjustments: adjust hangers so as to distribute loads equally on attachments.

C. Support Adjustment: provide grout under supports so as to bring piping and equipment to proper level and elevations.

3.7 PIPE APPLICATION

A. Condensate Drain Piping: Condensate drain piping from cooling coil drain pans shall be pitched at not less than one-eighth unit vertical in 12 units horizontal (1-percent slope) in the direction of discharge per Section MC 307.2.1.

B. Dissimilar Pipe Joints

1. Between Cast Iron and Threaded Pipe: Use a half coupling screwed onto the threaded pipe to form a spigot end and calk into the cast iron pipe.

2. Between Black Steel Pipe and copper pipe or tubing: Use a dielectric connector or brass converter fittings per Sections MC 1203.1.1.

3. Between galvanized steel pipe and copper pipe or tubing: Use a dielectric connector or brass converter fittings per Sections MC 1203.1.1.

4. Between Threaded Brass and Threadless Copper Pipe: Use a suitable brazing adapter.

5. Between Threaded Pipe and Types L Copper Tubing or Welded Brass: Water Tube: Use suitable cast bronze soldering adapter.

6. Between Cast Iron and Threadless Copper Pipe: Use an approved flanged adapter.

7. Between Cast Iron Soil Pipe and Type DWV Copper Tubing or Welded Brass: Drainage Tube: Use a suitable copper to soil pipe adapter and caulk into the cast iron pipe.

8. Between Type DWV Copper Tubing or Welded Brass Drainage Tube and Threaded Outlets at Drains or Fixtures: Use a suitable cast bronze adapter.

9. Between Grooved End Steel Pipe and Other Types of Pipe Joints, Pipe Fittings and Pipe Materials: Use adapter fittings and grooved end coupling fittings, as manufactured by the grooved end pipe fitting manufacturer.

3.8 PIPE AND FITTING SCHEDULE

A. Condensate Drain Piping: Connected to all drip piping from air handling units; all drains and overflow lines from heating and air conditioning systems, and all condensate piping systems connected to drain pans - All Sizes: Type L hard temper copper tubing and fittings. Minimum condensate drain line diameter shall be in accordance with MC Table 307.2.2.

3.9 CLEANING

A. Thoroughly clean all equipment and accessories prior to installation.

B. Remove all dirt, rust, dust, etc. from equipment and accessories after installation.

C. Remove and dispose of all debris and waste from the Site resulting from installation.

END OF SECTION

SECTION 23 23 00

REFRIGERANT PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install refrigerant piping complete and operational with accessories. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. This section includes:

1. Refrigerant tubing, fittings and joints

2. Automatic Refrigerant Shut-Off Solenoid Valves.

3. Refrigerant piping accessories.

C. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the refrigerant piping Work.

2. Notify other contractors in advance of the installation of the refrigerant piping to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the refrigerant piping Work.

D. Related Sections:

1. Section 23 05 29, Hangers and Supports for HVAC Piping and Equipment

2. Section 23 05 53, Identification for HVAC Piping and Equipment.

3. Section 23 07 19, HVAC Piping Insulation.

4. Section 23 09 23 18, Leak Detection Instruments.

5. Section 23 81 26, Split Heat Pump Air Conditioning System.

1.2 REFERENCES

A. American National Standards Institute (ANSI).

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

1. ASHRAE Standard 15 – Safety Standard for Refrigeration Systems.

C. American Society of Mechanical Engineers (ASME).

1. ASME/ANSI B16.18 – Cast Copper Alloy Solder Joint Pressure Fittings.

2. ASME/ANSI B16.22 – Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

3. ASME B40.100 – Pressure Gauges and Gauge Attachments.

D. American Society for Testing and Materials (ASTM).

1. ASTM B32 – Standard Specification for Solder Metal.

2. ASTM B280 – Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

3. ASTM B813 – Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.

4. ASTM B828 – Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

E. American Welding Society (AWS).

1. AWS A5.8/A5.8M – Specification for Filler Metals for Brazing and Braze Welding.

2. AWS A5.31 – Specification for Fluxes and Braze Welding.

3. AWS B2.2 – Specification for Brazing Procedure and Performance Qualification.

4. AWS B2.3 – Specification for Soldering Procedure and Performance Qualification.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
   a. Engage an experienced installer to perform the work of this Section who has specialized in installing refrigerant piping similar to that required for this Project and who is acceptable to manufacturer.

2. Brazing and Soldering:
   a. Qualify processes and operators in accordance with AWS B2.2 and B2.3 as appropriate for material to be brazed or soldered.
   b. Provide certification that operators employed on or to be employed for the Work have satisfactorily passed AWS qualification tests within previous 12 months. Ensure that all certifications are current.

B. Regulatory Requirements:

1. National Electrical Code (NEC).

2. National Fire Protection Association (NFPA).

3. Underwriters Laboratories Inc. (UL).

4. Local and State Building Codes and Ordinances.

5. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Drawings showing fabrication methods, assembly, accessories, and installation details, including supports, expansion joints, guides and anchors.
   b. 1/4-inch scale piping layouts, dimensioned to show length of runs, sizes, support spacing and expansion provisions.
   c. Setting drawings, templates, and directions for the installation of anchor bolts and other anchorages.

2. Product Data:
   a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all equipment.
   b. Complete component list.
   c. Detailed description of each component.
   d. Catalog cut sheets for each component.

e. Deviations from Contract Documents. Any exceptions to the Contract Documents must be clearly defined. Contractor shall be responsible for any additional expenses that may occur due to any exception made.
f. Automatic Refrigerant Shut-Off Solenoid Valves: Confirmation of integration with refrigerant leak detection system.
g. Other technical data related to specified material and equipment as requested by Engineer.

3. Testing Plans, Procedures, and Testing Limitations:
   a. Plan for performing required field testing.

B. Informational Submittals: Submit the following:

1. Manufacturer Instructions:
   a. Instructions and recommendations for handling, storing, protecting the equipment.
   b. Installation Data.
   c. Instructions for handling, start-up, and troubleshooting.

2. Field Quality Control Submittals:
   a. Written report presenting results of required field testing.

3. Supplier Reports:
   a. Submit written report of results of each visit to Site by Supplier's service personnel, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.

4. Qualifications Statements:
   a. Manufacturer, when requested by Engineer.
   b. Installer, when requested by Engineer.
   c. Brazing and Soldering, when requested by Engineer.

C. Closeout Submittals: Submit the following:

1. Record Documentation:
   a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of the Work, submit "pdf" of CADD drawings showing the actual in place installation of all refrigerant piping and equipment installed under this Section at a scale satisfactory to the Owner. The drawings shall show all piping on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the systems. Two paper prints shall also be furnished. The prints and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

2. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 SITE CONDITIONS

A. Existing Conditions:

1. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.

2. The Drawings are intended as an indication of the arrangement of equipment and piping and are as nearly correct as can be determined in advance of the actual construction of the Work. Equipment, piping and appurtenances found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

PART 2 - PRODUCTS

2.1 DETAILS OF MATERIALS

A. Tubing:

1. Tubing shall be seamless copper tube of Type ACR, hard or annealed, complying with ASTM B280.

2. Tubing shall be clean, dehydrated, and supplied with a nitrogen charge and pressure tight plugs for each length.

B. Fittings:

1. Fittings shall be in long pattern and shall be wrought copper or copper alloy conforming to the requirements of ASME/ANSI 16.22 or cast copper alloy conforming to the requirements of ASME/ANSI 16.18.

2. Unions shall be wrought or cast copper with a 300 psig working pressure, female pattern, brass to brass seat, and ground joint.

3. Gaskets shall be of a material suitable for the refrigerant, temperature and pressure for which they will be used.

C. Joints:

1. Joints shall be brazed using alloys meeting the requirements of AWS A5.8/A5.8M with BCuP or BAg designation. Press fittings shall not be permitted.

2. Joints between dissimilar metals shall be fabricated using an approved brazing flux conforming to the requirements of AWS A5.31, Types FB3A or FB3C, and an appropriate brazing filler metal with BCuP or BAg designation.

3. The outside of the copper tube and the inside of the fitting where brazing rod will be applied, shall be cleaned and burnished with fine crocus cloth until all dirt and oxide is removed. A light coat of non-corrosive brazing flux shall be applied to both pipe and fittings (Acid flux shall not be used). Joint shall be uniformly heated to proper brazing temperature and the brazing material shall be fed to the joint until a uniform line of brazing material appears around the pipe at the end of the fitting. Brazing shall be done only by mechanics that are qualified for brazing refrigerant piping.

4. Fittings for copper tubing for refrigerant use shall be wrought copper with brazed type ends as applicable. Forged brass fittings are also acceptable for this purpose. Fittings shall be suitable for working pressure up to 250 psi. The use of cast brass fittings for this service will not be approved.

D. Automatic Refrigerant Shut-Off Solenoid Valves:

1. General Requirements:
   a. Provide normally-closed (NC), two-way solenoid shut-off valves for refrigerant lines where indicated on drawings or required for leak isolation.
   b. Valve shall be compatible with A2L class refrigerants, including R-454B, and rated for use in commercial applications.
   c. Valves shall be UL Listed or Recognized for use with flammable refrigerants per UL 60335-2-40 or UL 60335-2-89.
   d. Provide valve and matching coil as an assembly from the same manufacturer.

2. Construction:
   a. Body: Forged brass construction with extended copper sweat connections.
   b. Connection Sizes: 1/2 inch and 5/8 inch outside diameter solder-type connections, as required.
   c. Seals: PTFE or equivalent material suitable for A2L refrigerants and rated for refrigerant temperatures from -40°F to 250°F (-40°C to 121°C).
   d. Coil Enclosure: Moisture-resistant Class F insulation; NEMA 1 or better.
   e. Valve to have manual stem or override as required for service.

3. Performance Requirements:
   a. Maximum Working Pressure: Minimum 650 psig (45 bar).
   b. Maximum Operating Pressure Differential (MOPD): Not less than 450 psig.
   c. Minimum Operating Temperature: -40°F.
   d. Electrical Coil Voltage: As required for integration with leak detection controller (typically 24 VAC or 120 VAC), to be field confirmed.

4. Control Integration:
   a. Valve shall be actuated by signal from a gas detection system capable of detecting refrigerant leaks.
   b. Coil control circuit shall be compatible with controller’s relay outputs.
   c. Valve shall fail closed upon power loss or alarm signal.

5. Acceptable Manufacturers:
   a. Parker Sporlan – Model SSOV Series (e.g., SSOV6S140 or SSOV10S150) with MKC-1 coil.
   b. Danfoss – EVR v2 Series with flammable refrigerant rating and suitable clip-on coil.
   c. Or approved equal.

2.2 ACCESSORIES

A. Mechanical Link Seals:

1. Manufacturer: Provide product of one of the following:
   a. Pipeline Seal and Insulator, Inc.
   b. Thunderline Corporation.

c. Calpico, Inc.
d. Or equal.

2. Provide mechanical link seals through walls or floors with adjusting bolts suitable for 20 psig of pressure where shown or specified.

3. Details of Construction:
   a. Non-Fire Rated Seals:
      1) Pressure Plates: Glass reinforced nylon composite.
      2) Bolts and Nuts: Type 316 stainless steel.
      3) Sealing Element: EPDM.
   b. Fire Rated Seals:
      1) Pressure Plates: Zinc dichromate steel.
      2) Bolts and Nuts: Two part zinc dichromate steel with corrosion inhibiting coating.
      3) Sealing Element: Silicone.
      4) 1-1/2-hour fire rating.

B. Sleeves and Wall Pipes:

1. General:
   a. Wall pipes and wall sleeves shall be provided in accordance with the following schedule when passing through new or existing concrete or masonry structures, except where noted otherwise:

From	To	Fitting
Dry area	Wet area	Wall Pipe
Dry area	Earth Exterior	Wall Pipe
Dry area	Dry area	Plain Sleeve
Earth	Earth	Plain Sleeve
Exterior	Exterior	Plain Sleeve

   b. Material of construction shall be Type 316 stainless steel where located in corrosive areas and G90 hot dipped galvanized steel in non-corrosive areas.

2. Sleeves:
   a. Wall sleeves shall be Schedule 40.
   b. Shall be of sufficient size to pass the pipe and the insulation covering the pipe.
   c. Shall extend 2-inches above the finished floor.
   d. Shall be provided with split type escutcheon plates at the floor and wall openings.
   e. Shall terminate flush with walls and ceilings.
   f. Shall not be required in existing concrete walls where walls are core drilled and the resulting hole has a smooth inside surface.
   g. Shall be caulked with a fire retardant caulking compound at firewalls and a gas tight caulking compound at gas tight walls.

3. Wall Pipes:
   a. Wall pipes shall be equipped with a waterstop.
   b. Shall be of sufficient length to pass through the wall and provide adequate clearance for fastening.

c. The end of the wall pipes shall be of a type consistent with the piping to be connected to them and shall conform to their standards and specifications.
d. All wall pipes shall have the same interior protection as specified for the connecting piping. Exterior protection shall be as specified for the yard piping.

C. Structural Supports:

1. Contractor shall provide and install all hangers, rods, supports, bolts, nuts, washers, inserts, and appurtenances as required to mount all refrigerant piping.

2. All hangers, rods, supports, bolts, nuts, washers, inserts, and appurtenances shall conform to Section 23 05 29, Hangers and Supports for HVAC Ductwork, Piping, and Equipment.

2.3 IDENTIFICATION

A. All piping and equipment identification shall be provided in accordance with Section 23 05 53 - Identification for HVAC Piping and Equipment.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.2 PREPARATION

A. Protection of Surrounding Areas/Surfaces:

1. Properly plug or cap the open ends of all piping at the end of each day's Work or other stopping point through construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.3 INSTALLATION

A. General:

1. Install the piping and equipment in accordance with the Contract Documents and by manufacturer's instructions and recommendations. Obtain written interpretation from Engineer in the event of conflict between manufacturer's instructions and recommendations and the Contract Documents.

2. Install in accordance with Laws and Regulations.

3. Do not modify structures to facilitate installation of piping, unless specifically approved by Engineer.

4. Installation shall conform to requirements of all local and state codes.

B. All refrigerant piping installations shall conform to ANSI/ASHRAE Standard 15.

C. All pipes, whether insulated or not, shall be identified with pipe labels and the direction of flow indicated.

D. Install oil traps and oil return line tubing in refrigerant piping, as required.

E. All valves shall be manually opened and closed before installation to check their operation, and the interior of the valves shall be cleaned. Joints shall be made as specified.

F. Install the valves so that they can be conveniently operated.

G. Valves shall be supported as integral components of the piping systems.

H. For systems containing more than 6.6 pounds of a refrigerant in systems using positive-displacement compressors, isolation valves shall be installed:

1. At the inlet of each compressor, compressor unit or condensing unit.

2. At the discharge outlet of each compressor, compressor unit or condensing unit and each liquid receiver.

I. Before setting wall sleeves, pipes, castings and pipes to be cast-in-place, Contractor shall coordinate with the Drawings and Figures, which may have a direct bearing on the pipe locations. Contractor shall be responsible for coordinating the proper location of the pipes and appurtenances during the construction with all trades.

J. Field coordinate for exact pipe penetrations and routing of all piping.

K. Provide mechanical link seals with sleeves or wall pipes at all piping penetrations through wall, roof and floor slabs.

L. Escutcheon plates shall be provided for all exposed piping penetrations.

M. Contractor shall coordinate accessories included in packaged and split air conditioning equipment. Any accessories not included shall be provided by Contractor.

N. Contractor shall furnish and install a complete charge of refrigerant.

3.4 FIELD QUALITY CONTROL

A. Field Tests:

1. Remove and plug the connection points of any controls or relief valves that could be damaged by test pressure.

2. Remove all expansion valves and install temporary bypasses.

3. Front seat both the compressor suction and discharge valves.

4. Open the liquid line shutoff valve at the condenser, and any auxiliary valves in the hot gas and liquid lines.

5. Apply control power to open all solenoid valves.

6. Connect a cylinder of oil free dry nitrogen to the front seat port of the compressor discharge valve.

7. Introduce dry nitrogen into the system to a design test pressure listed on the condensing unit, compressor or compressor unit nameplate, as required by ANSI/ASHRAE Standard 15.

8. Test all piping for leaks by observing system pressure drop and applying a bubble test to all joints and connections.

9. After testing is completed, bleed the test pressure and repair any leaks found.

10. After the system is assumed to be free of leaks, charge enough refrigerant through the liquid line charging valve to raise the pressure to 15 psig. Remove the refrigerant connection and charge enough dry nitrogen into the system to raise the system pressure to the listed design test pressure.

11. Test all joints with an electronic leak detection meter. Record all test results.

12. After the results of the pressure tests have been approved, release test pressure and mechanically evacuate the system to a minimum of 22-inches Hg vacuum and maintain for 24 hours with no leaks. Disconnect the vacuum pump prior to vacuum leak test.

13. Record and report the test results.

14. After test results have been approved by Engineer, remove plugs and temporary bypass, and fully charge the system with the specified refrigerant.

15. All leaking joints shall be disassembled and remade using new materials. Retesting shall be conducted on all portions failing the tests.

B. Inspection:

1. Examine areas to receive piping and accessories for:
   a. Defects that adversely affect execution and quality of the Work.
   b. Deviations beyond allowable tolerances.
   c. Start the Work only when conditions are satisfactory.

2. The Engineer reserves the right to reject or authorize replacement of piping and accessories found to be defective or deviated from allowable tolerances.

3.5 ADJUSTING

A. Adjust all controls for proper settings.

B. While system is operable, balance all equipment to achieve design conditions.

3.6 CLEANING

A. Remove all dirt, rust, dust, etc. from refrigerant piping after installation.

B. Remove and dispose of all debris and waste from the Site resulting from installation.

3.7 SCHEDULES

A. All refrigerant piping shall be sized in accordance with manufacturer's recommendation.

END OF SECTION

SECTION 23 31 13

HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install metal ductwork complete and operational with accessories. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. This section includes:

1. Metal ducts

2. Metal ducts accessories
   a. Duct Hardware
   b. Duct Access Doors
   c. Flexible Air Ducts
   d. Miscellaneous duct fittings
   e. Sleeves
   f. Duct Gaskets
   g. Hardware and Fasteners
   h. Grilles and Diffusers
   i. Damper Assemblies

1.2 COORDINATION

A. Notify other Contractors in advance of the installation of metal ductwork to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before, the metal ductwork Work.

1.3 RELATED SECTIONS:

A. Section 23 05 29, Hangers and Supports for HVAC Piping and Equipment

B. Section 23 05 53, identification for HVAC Piping and Equipment.

C. Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

D. Section 23 07 13, Duct Insulation.

E. Section 23 09 23, Direct-Digital Control System for HVAC.

1.4 REFERENCES

A. Air Movement and Control Association International, Inc. (AMCA).

1. AMCA Standard 500-D – Laboratory Methods of Testing Dampers for Rating.

2. AMCA Publication 511 – Certified Ratings Program - Product Rating Manual for Air Control Devices.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

1. ASHRAE Standard 52.2 – Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

C. American Society for Testing and Materials (ASTM).

1. ASTM E84 – Standard Test Method for Burning Characteristics of Building Materials.

2. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

3. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. American Welding Society (AWS).

1. AWS B2.1 – Specification for Welding Procedure and Performance Qualification.

E. National Fire Protection Association (NFPA).

1. NFPA 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems.

2. NFPA 90B – Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

3. NFPA 701 – Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

1. Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems.

2. HVAC Duct Construction Standards – Metal and Flexible.

3. Underwriters Laboratories Inc. (UL).

4. UL 181 – Factory-Made Air Ducts and Air Connectors.

5. UL 181A – Closure Systems for Use With Rigid Air Ducts.

6. UL 181B – Closure Systems for Use With Flexible Air Ducts and Air Connectors.

7. UL 555 – Fire Dampers.

8. UL 555S – Smoke Dampers.

9. UL 900 – Air Filter Units.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
   a. Engage an experienced installer to perform the work of this Section who has specialized in installing metal ductwork similar to that required for this Project and who is acceptable to manufacturer.
   b. Welding:
   c. Qualify processes and operators in accordance with AWS B2.1 as appropriate for material to be welded.
   d. Provide certification that operators employed on or to be employed for the Work have satisfactorily passed AWS qualification tests within previous 12 months. Ensure that all certifications are current.

1.6 REGULATORY REQUIREMENTS:

A. National Electrical Code (NEC).

B. National Fire Protection Association (NFPA).

C. Underwriters Laboratories Inc. (UL).

D. Local and State Building Codes and Ordinances.

E. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

1.7 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Drawings showing fabrication methods, assembly, accessories, and installation details.
   b. 1/4-inch scale duct layouts, dimensioned to show length of runs, sizes, support spacing and expansion provisions.

   c. Detailed installation drawing of each individual component showing:
      1) Mounting requirements.
      2) Locations.
   d. Setting drawings, templates, and directions for the installation of anchor bolts and other anchorages.

2. Product Data - General:
   a. Manufacturer's literature, illustrations, specifications, weight, wall thicknesses, design pressures, dimensions, required clearances, materials of construction, and performance data for all equipment.
   b. Complete component list.
   c. Detailed description of each component.
   d. Catalog cut sheets for each component.
   e. Deviations from Contract Documents. Any exceptions to the Contract Documents must be clearly defined. Contractor shall be responsible for any additional expenses that may occur due to any exception made.
   f. Other technical data related to specified material and equipment as requested by Engineer.

3. Product Data –Diffusers, Grilles, Registers:
   a. Schedule of diffusers, registers and grilles indicating drawing designation, room location, quantity, model number, size, and accessories.
   b. Data sheet for each type of air outlet and inlet, and accessory indicating construction, finish, and mounting details.
   c. Performance data for each type of air outlet and inlet including blade setting angle, cfm, pressure drop, temperature and velocity traverses, throw and drop, and noise criteria ratings.

B. Informational Submittals: Submit the following:

1. Manufacturer Instructions:
   a. Instructions and recommendations for handling, storing, protecting the equipment.
   b. Installation Data.

2. Source Quality Control Submittals:
   a. Factory test reports.

3. Field Quality Control Submittals:
   a. Written report presenting results of required field testing.

4. Supplier Reports:
    a. Submit written report of results of each visit to Site by Supplier's service personnel, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.

5. Qualifications Statements:
    a. Installer, when requested by Engineer.

C. Closeout Submittals: Submit the following:

1. Record Documentation:
    a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of the Work, submit "pdf" of CADD drawings showing the actual in place installation of all ductwork and equipment installed under this Section at a scale satisfactory to the Owner. The drawings shall show all ductwork on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the systems. Two paper prints shall also be furnished. The prints and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.8 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

2. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of that Work.

3. Comply with manufacturer's recommendations for rigging of equipment.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.9 SITE CONDITIONS

A. Existing Conditions:

1. The Contract Documents show the general arrangement and extent of the Work to be done. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work is governed by the general building plans and the actual building conditions.

2. The Drawings are intended as an indication of the arrangement of equipment and ductwork and are as nearly correct as can be determined in advance of the actual construction of the Work. Equipment, ductwork, and appurtenances found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. System Description:

1. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of the systems, Contractor, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval.

2. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case and adequately provide for expansion and minimize the amount of space required for the same.

3. The Drawings do not show all offsets, fittings, accessories and details, which may be required. Contractor shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work “by others,” to complete the systems to the true extent of the Contract Documents.

B. Design Criteria:

1. All sheet metal construction shall be in accordance with the construction details and installation details in the latest edition of the SMACNA HVAC Duct Construction Standards. This Standard is hereinafter referred to as HVAC DS.

2. Sheet metal construction shall conform to the following minimum pressure classification (positive and negative pressure), unless otherwise shown or specified:
   a. All ductwork: 2-inch W.G.

3. Seal Class, Duct Leakage:
   a. All ductwork: Seal Class A, duct leakage class 2.

2.2 DETAILS OF MATERIALS

A. Material Type:

1. Galvanized steel ductwork shall be G90 hot dipped in accordance with ASTM A653/A653M.
   a. All accessories for galvanized ductwork shall be G90 hot dipped galvanized steel, unless noted otherwise.

2. Aluminum ductwork shall be Alloy 3003 – H-14 in accordance with ASTM B209.
   a. All accessories for aluminum ductwork shall be aluminum, unless noted otherwise.

3. Duct construction alternatives (duct gauge in relation to reinforcement spacing) selected by Contractor from HVAC DS Tables shall be identified by duct system and shall be submitted in schedule form to the Engineer prior to beginning installation of ductwork. Contractor shall construct ductwork to meet the requirements of the HVAC DS Tables in conjunction with the minimum duct thickness schedules in Article 3.10 except where noted below.

B. Thickness of aluminum ductwork and size and thickness of aluminum supports shall be appropriately converted using the aluminum conversion tables in the HVAC DS.

C. Rectangular ductwork longitudinal seams shall be Pittsburgh Lock type with permanently elastomeric sealant applied continuously within the seam.

D. Round ductwork seams shall be spiral lock seam.

E. Duct reinforcement shall be made using external stiffener angles. Tie rods shall not be acceptable. Stiffener angles shall be constructed of the same material as the ductwork.

F. Transverse Joints:

1. Manufacturer: Provide product of one of the following:
   a. Ductmate Industries, Inc.
   b. Elgen Manufacturing Company, Inc.
   c. Or equal.

2. Ductwork shall be connected by a mechanical joining system, except where otherwise noted.

3. Manufacturer's installation instructions will be followed, except where otherwise noted.

4. SMACNA T-24 and other flange type connectors formed from the duct edge will NOT be allowed.

5. All connectors shall meet or exceed the functional criteria outlined in the HVAC DS and shall be constructed of the same material as the ductwork.

G. Turning Vanes:

1. Manufacturer: Provide product of one of the following:
   a. Ductmate Industries, Inc.
   b. Elgen Manufacturing Company, Inc.
   c. C.L. Ward & Family, Inc.
   d. Or equal.

2. Material: Same material as ductwork.

3. Ducts 24-inches or shorter:
   a. Vanes: Single thickness.
   b. Runners: Type 2.

4. Ducts taller than 24-inches:
   a. Vanes: Double thickness.
   b. Runners: Type 1.

H. Splitter Dampers:

1. Reference: HVAC DS.

2. Material: Same material as ductwork.

I. Transitions and Offsets:

1. Reference: HVAC DS.

2. Material: Same material as ductwork.

J. Branch Take-Offs:

1. Reference: HVAC DS.

2. Material: Same material as ductwork.

3. 45 degrees, NO straight taps, unless specifically shown.

K. Rectangular Square Throat Elbows:

1. Reference: HVAC DS.

2. Material: Same material as ductwork.

3. Provided with turning vanes.

L. Rectangular Radius Elbows and Round Elbows:

1. Reference: HVAC DS.

2. Material: Same material as ductwork.

3. Centerline Radius: R=1.5W, unless specifically shown otherwise.

M. Round Converging Flow Fittings:

1. Converging flow fittings shall be constructed with a radius entrance to all branch taps and with no excess material projecting from the body into the branch tap entrance.

2. Branch entrances shall be by means of factory-fabricated fittings or factory fabricated duct tap assemblies.

N. Flexible duct or duct constructed of fiberglass duct board shall not be permitted, except where specifically shown or indicated.

2.3 ACCESSORIES

A. Duct Hardware

1. Provide test hole fittings for making air readings for the proper adjusting and testing of the ventilating systems. Material and gauge of the fittings shall be compatible with the duct material. Include screw cap and gasket. Size of fitting shall allow insertion of testing instruments and of length of fitting shall allow for the duct insulation thickness. "Duro Dyne", instrument test port, "Ventlock 699" are suitable for this purpose. If required, provide test hole fitting for microprocessor type of instrument reading either local or remote.

2. Provide shop fabricated duct hardware or provide from of one of the following manufacturers:
   a. Duro Dyne Corp.
   b. Young Regulator Co.
   c. Or equal.

B. Duct Access Doors

1. Provide duct access doors to permit inspections, operation and maintenance of all valves, coils including reheat coils, controls, fire dampers, fire/smoke dampers, air monitors where applicable, automatic or motorized dampers, filters, bearings, traps, or other apparatus concealed behind the sheet metal work.

2. Construction: Construct of same or greater gage as ductwork served, provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide 2 handle latch type access doors.

3. General Contractor shall provide access doors for access to valves, dampers and all the aforementioned equipment concealed in walls, furring and hung ceilings. The size of the access doors shall be at least 24" x 24".

4. Provide shop fabricated duct access doors or provide from one of the following manufacturers:
   a. Duro Dyne Corp.
   b. Ruskin Mfg.
   c. Air Balance Inc.
   d. Or equal.

C. Flexible Air Ducts:

1. Design and Performance Criteria:
   a. Flexible air ducts shall be tested in accordance with UL 181.
   b. Flexible air ducts shall be listed and labeled as Class 0 or Class 1 flexible air ducts.
   c. Flexible air ducts including insulation and jacketing shall have the following Fire Hazard Classifications in accordance with ASTM E84:
      1) Flame Spread: 25 maximum.
      2) Smoke Developed: 50 maximum.
   d. Flexible connectors shall meet NFPA 90A, NFPA 90B, and local building codes.
   e. Maximum Design Total Static Pressure: 10.0-inch W.G.
   f. Maximum Operating Velocity: 4000 fpm.
   g. Maximum Water Vapor Transmission: 0.05 perm.

2. Product and Manufacturer: Provide one of the following:
   a. Model M-KC, as manufactured by Thermaflex – A Division of Flexible Technologies, Inc.
   b. Model F296, as manufactured by Hart & Cooley, Inc.
   c. Or equal.

3. Details of Construction:
   a. Flexible ductwork shall be limited to six feet and allowed only where shown or indicated on Drawings.
   b. Inner liner shall be woven and coated fiberglass fabric permanently bonded to a coated spring steel wire helix.
   c. Fiberglass insulation shall have a minimum thermal conductance R-value of 6.
   d. Outer jacket shall be a fiberglass scrim reinforced aluminized polyester film vapor barrier.

D. Miscellaneous Duct Fittings:

1. Reference: HVAC DS.

2. Material: Same material as ductwork.

E. Sleeves:

1. Material: Same material as ductwork passing through opening.

2. Thickness: Minimum 24-gauge.

3. Calk airtight with fire resistant sealant between sleeve and ductwork.

F. Duct Gaskets:

1. Product and Manufacturer: Provide one of the following:
   a. Model 440 Gasket Tape, as manufactured by Ductmate Industries, Inc.
   b. Model 440 Butyl Gasket, as manufactured by Elgen Manufacturing Company, Inc.
   c. Or equal.

2. Material: Non-hardening butyl.

3. Service Temperatures: -30 degrees F to 180 degrees F.

4. Service Life: 20 years minimum.

5. Gaskets shall have the following Fire Hazard Classifications in accordance with ASTM E84:
   a. Flame Spread: 10 maximum.
   b. Smoke Developed: 10 maximum.

G. Hardware and Fasteners:

1. All hardware and fasteners for aluminum ductwork shall be Type 316 stainless steel, unless noted otherwise.

2. All hardware and fasteners for galvanized ductwork shall be G90 hot dipped galvanized steel, unless noted otherwise.

H. Grilles and Diffusers:

1. General:
   a. Grilles and diffusers mounted in hung ceilings shall have a baked enamel white finish.
   b. Where registers are shown to be provided in lieu of grilles, include an integral opposed blade damper of the same construction as the grille.

2. Supply Grilles (SG):
   a. Product and Manufacturer: Provide one of the following:
      1) Steel construction:
         a) Model 20, as manufactured by Anemostat.
         b) Model T54 as manufactured by Tuttle & Bailey.
         c) Model 300RL- as manufactured by Titus.
         d) Or equal.

b. Double deflection with horizontal face bars for horizontal duct and vertical face bars for vertical duct.
c. 3/4-inch blade spacing.
d. For surface mounting as shown or indicated on Drawings.

3. Return/Exhaust Grilles (RG/EG):
   a. Product and Manufacturer: Provide one of the following:
      1) Aluminum construction:
         a) Model X30, as manufactured by Anemostat.
         b) Model A70, as manufactured by Tuttle & Bailey.
         c) Model FL, as manufactured by Titus.
         d) Or equal.
      2) Single 0- or 45-degree deflection with horizontal face bars for horizontal duct and vertical face bars for vertical duct.
   b. 3/4-inch blade spacing.
   c. For surface mounting as shown or indicated on Drawings.

4. Ceiling Return/Exhaust Grilles (CRG/CEG) (For use with Return or Exhaust Grille Plenum Detail):
   a. Product and Manufacturer: Provide one of the following:
      1) Aluminum construction:
         a) Model XAC3LOD, as manufactured by Anemostat.
         b) Model A70D, as manufactured by Tuttle & Bailey.
         c) Model 3FL, as manufactured by Titus.
         d) Or equal.
      2) Single 45-degree deflection with horizontal face bars parallel to long dimension.
   b. 3/4-inch blade spacing.
   c. Provide opposed blade damper in plenum.
   d. For use in T-bar ceiling as shown or indicated on Drawings.

5. Grid Core Grilles (GCG):
   a. Product and Manufacturer: Provide one of the following:
      1) Aluminum construction:
         a) Model CRE1000, as manufactured by Tuttle & Bailey.
         b) Model 50F, as manufactured by Titus.
         c) Or equal.
   b. 1-inch by 1-inch by 1-inch extruded grid core.
   c. 0-degree deflection.
   d. For surface mounting as shown or indicated on Drawings.

6. Supply Air Diffusers (SAD):
   a. Product and Manufacturer: Provide one of the following:
      1) Aluminum construction:
         a) Model EPLA, as manufactured by Anemostat.
         b) Model A1200A, as manufactured by Tuttle & Bailey.
         c) Model TMSA-AA, as manufactured by Titus.
         d) Or equal.
   b. 24-inch by 24-inch louvered face with adjustable internal air pattern controller.
   c. Round neck.
   d. 360 degree discharge pattern.

e. For use in T-bar ceiling as shown or indicated on Drawings.

7. Plaque Air Diffusers (PAD):
   a. Product and Manufacturer: Provide one of the following:
      1) Aluminum construction:
         a) Model PGL, as manufactured by Anemostat.
         b) Model A1100, as manufactured by Tuttle & Bailey.
         c) Model OMNI-AA, as manufactured by Titus.
         d) Or equal.
      2) 24-inch by 24-inch architectural diffuser with 18-inch square plaque face.
   b. Round neck.
   c. 360 degree horizontal air pattern.
   d. For use in T-bar ceiling as shown or indicated on Drawings.

8. Circular Plaque Air Diffusers (CPAD):
   a. Product and Manufacturer: Provide one of the following:
      1) Aluminum construction:
         a) Model CM-1P, as manufactured by Anemostat.
         b) Model RT1100, as manufactured by Tuttle & Bailey.
         c) Model R-OMNI, as manufactured by Titus.
         d) Or equal.
   b. Round architectural diffuser with round plaque face.
   c. Round neck.
   d. 360 degree horizontal air pattern.
   e. For surface mounting or use in exposed duct as shown or indicated on Drawings.

9. Fire Damper Grille: Provide grille, an interlocking blade type fire damper and a volume control device.

I. Damper Assemblies

1. Product and Manufacturer: Subject to compliance with requirements, provide shop fabricated volume and control damper assemblies or factory fabricated volume and control damper assemblies from one of the following manufacturers:
   a. Product and Manufacturer: Provide one of the following:
      1) Ruskin Mfg.
      2) Greenheck Fan Corp.
      3) Arlan Damper Corp. – Division of Duro-Dyne Corporation (for use in galvanized ductwork only)

2. Volume Dampers
    a. Opposed Blade Damper assemblies: Opposed blade type frames of all welded construction utilizing channel iron members in galvanized steel ducts; extruded members in aluminum ducts and stainless steel in stainless steel ducts. Fabricate frames in accordance with SMACNA HVAC Duct Construction Standards, 2005 or Latest Edition. Fabricate blades from No. 18 gage (minimum) metal of same material as duct. Single blade damper assemblies are unacceptable for ducts over 12" in height. Blades shall be connected by a common linkage. Manual operated damper assemblies shall have a quadrant locking device. Weld motor mounting bracket to damper frame for pneumatic or electric motor operated damper assemblies.
    b. Parallel Blade Damper Assemblies (Ref. SMACNA HVAC Duct Construction Standards, 2005 or Latest Edition): Provide metal frames of all welded construction, utilizing channel iron members in steel ducts and extruded aluminum members in aluminum ducts. Fabricate blades from No. 18 gage (minimum) metal, of same material as duct. Single blade damper assemblies are unacceptable for ducts over 12" in height. Blades shall be connected by a common linkage. Weld motor mounting bracket to damper frame for pneumatic or electric motor operated dampers. Shop coat raw ferrous parts of damper assemblies with corrosion resistant paint.
    c. Splitter damper assemblies shall not be used. Volume control in duct branches shall be by volume damper assemblies.
    d. Manual Damper Regulators (Ref. SMACNA HVAC Duct Construction Standards, 2005 or Latest Edition)
        1) For Damper Assemblies Installed in Exposed or Accessible Concealed Ductwork: Indicating quadrant with heavy metal handle and means for locking damper in all positions.
        2) For Dampers Assemblies Installed in Inaccessible Concealed Ductwork: Concealed type with indicating regulator in cast metal box with cover plate. Provide assembly complete with duct and bearing, adjustment coupling, damper extension rods and minimum of 2 keys or socket wrenches for each type of damper adjustment screw or device.
    e. Damper assemblies in aluminum ducts shall be aluminum, in stainless ducts, stainless steel. Fabricate blades of same material as duct in which the dampers are installed.

f. All outdoor intake damper assemblies and exhaust air discharge damper assemblies terminating at an exterior louver, fan or located outdoors shall be Class I motorized opposed blade low leakage type with a maximum of 4 CFM per square foot at 1.0" WC across the damper assembly. Include AMCA 500D-2018 prototype leakage test certifications with the shop drawing submission for all dampers. Exception: Gravity (non-motorized) exhaust and relief damper assemblies are permitted as shown on the Drawings for buildings less than three stories in height above grade and for outside air intake or exhaust airflows of 300 cfm or less. Gravity damper assemblies shall have a maximum leakage rate of 20 cfm/SF at 1.0” WC when tested in accordance with AMCA 500D-2018. Gravity damper assemblies for ventilation air intakes shall be protected from direct exposure to wind. Gravity damper assemblies smaller than 24 inches in either dimension shall be permitted to have a leakage of 40 cfm/SF at 1.0” WC when tested in accordance with AMCA 500D-2018.

g. All modulating damper assemblies shall be the opposed-blade type; all two-position dampers shall be parallel-blade type. Damper assemblies in galvanized sheet metal shall be made of galvanized sheet steel; blades shall not be more than 6" in width.

J. Damper Actuators

1. Provided by Temperature Control Contractor (TCC) when not provided as part of the factory assembly of the air handlers or rooftop units. ATC to coordinate with Mechanical Contractor.

K. Fire Damper Assemblies

1. Provide 1½ hour or 3 hour-fire rated damper assemblies, listed under UL 555-2006 of types and sizes indicated on the Drawings. For galvanized duct installations, construct damper casings/blades of galvanized steel. For aluminum duct installations, construct damper casings/blades of stainless steel. Provide fusible link rated at 50°F over the maximum temperature that is normally encountered when the system is in operation or shut down, but not less than 160°F. Provide damper assemblies with positive lock in closed position. Blade Material: Steel, match casing.

2. Each fire damper assembly shall be supplied with factory fabricated steel sleeves and retaining angles as per SMACNA: Fire, Smoke & Radiation Damper Installation Guide for HVAC Systems – 2005 or Latest Edition and in accordance with the manufacturers' UL approved installation. Gauge of sleeve shall be at least equal to gauge of duct when one or more of the following duct sleeve connections are used: plain S slip, hemmed S slip, standing S slip, reinforced standing S slip, inside slip joint, or double S slip and other UL/SMACNA approved breakaway connections. If any other duct sleeve connections are used other than UL breakaway connections, the sleeve shall be minimum 16 gauge for dampers up to 36” wide X 24” high and 14 gauge if width exceeds 36” or height exceeds 24. Fire damper assemblies shall have UL labels affixed to them.

2.4 IDENTIFICATION

A. All equipment and component identification shall be provided in accordance with Section 23 05 53 – Identification for HVAC Piping and Equipment.

2.5 SOURCE QUALITY CONTROL

A. Shop Tests:

1. Equipment shall be completely manufactured and pre-assembled in accordance with Reference Standards. Perform the following tests and inspections at factory before shipment:
   a. Tested and inspected for approval as a unit by Underwriters Laboratories Inc., UL Label or equal.
   b. Factory test equipment to ensure that the entire package has been properly fabricated and assembled, that all the controls function as specified herein and that the package meets the specified performance requirements including manufacturer's data report.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.2 PREPARATION

A. Protection of Surrounding Areas/Surfaces:

1. Openings and penetrations shall be capped to protect the building from outside conditions.

2. Properly cap the open ends of all ductwork at the end of each day's Work or other stopping point throughout the construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.3 INSTALLATION

A. General:

1. Install the equipment in accordance with the Contract Documents and by manufacturer's instructions and recommendations. Obtain written interpretation from Engineer in the event of conflict between manufacturer's instructions and recommendations and the Contract Documents.

2. Install in accordance with Laws and Regulations.

3. Do not modify structures to facilitate installation of equipment, unless approved in writing by Engineer.

4. Installation to conform to requirements of all local and state codes.

B. All ductwork shall conform accurately to the dimensions shown, the ducts shall be straight and smooth inside with joints neatly finished. Ductwork shall be installed so as to preclude the possibility of vibration under all operating conditions.

C. Install ductwork to allow maximum headroom. Properly seam, brace, stiffen, support and render ducts mechanically airtight. Adjust ducts to suit job conditions. Dimensions may be changed as approved, if cross sectional area is maintained.

D. Pitch horizontal ducts connected to shower room exhaust downward toward exhaust air outlet not less than 1" in 10'.

E. Provide necessary transformation pieces, and flexible fabric connections for ductwork connected to air handling units or air inlet and outlet devices.

F. Routing: Locate ductwork runs, except as otherwise indicated on the Drawings, vertically and horizontally and avoid diagonal runs wherever possible. Drawings are essentially diagrammatic. Provide offsets, rises, drops, all other items, accessories and necessary work as required to fit structure, avoid obstruction, and retain clearances, headroom openings and passageways. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Install parallel to or at right angles to walls and partitions, parallel to ceilings, level and plumb, unless shown otherwise. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown on the Drawings. Coordinate layout with suspended ceiling and lighting fixtures and similar finished work. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

G. Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least $1^1/_2$".

H. Tape and seal all joints in accordance with HVAC DS. Tape shall not be used as the primary means of sealing. Tape used in sealing metallic ductwork shall be listed and labeled in accordance with UL 181A and shall be marked “181 A-P” for pressure-sensitive tape, “181 A-M” for mastic or “181 A-H” for heat-sensitive tape. Tape used in sealing flexible ductwork and connectors shall be listed and labeled in accordance with UL 181B and shall be marked “181 B-FX” for pressure-sensitive tape or “181 B-M” for mastic.

I. Fire dampers shall be provided and installed where indicated and where required by UL and authorities having jurisdiction, and shall be approved by local building codes and in accordance with the requirements of the NFPA.

J. Install all ductwork and accessories to provide a system free from buckling, warping, bellowing, or vibration.

K. All ducts at flexible connections with fans shall be supported at free end within 12-inches of flexible connection.

L. Provisions shall be made for supporting all ductwork, dampers, and other ductwork accessories, where necessary.

M. Coordinate all air outlets for compatibility with ceiling system.

N. Coordinate duct installations with installation of accessories, dampers, air handling unit, controls and other associated work of the ductwork system. Coordinate work of other trades affecting the ductwork. Penetrations made by all trades are to be sealed to an air-tight condition. Testing of ductwork shall be performed after all penetrations have been made, or redone if made after original testing.

O. Installation Of Acid Storage Room Exhaust Ducts:

1. Provide and fabricate joints and seams that are watertight and provide airtight construction. Install without dips or traps that may collect residues. Install duct in accordance with NFPA 45-2015 and ASHRAE Standards. Ducts shall be made tight with lap joints having a minimum lap of 1”. Joints used in SMACNA/ANSI Round Industrial Duct Construction Standards and SMACNA/ANSI Rectangular Industrial Duct Construction Standards are also acceptable.

2. The stack shall terminate a minimum of 10' above the high point of the roof structure within 10 ft. Open ends shall be covered with bird screens.

P. Connections: General Contractor shall arrange to have the connections of metal ductwork to equipment and shall provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery.

Q. Flexible Ducts

1. Maximum Length: For any duct run using flexible ductwork, do not exceed 3'-0" extended length. Per Section MC 607.7, flexible ducts and air connectors shall not pass through any fire-resistance-rated assembly. Flexible air connectors shall not pass through any wall, floor or ceiling.

R. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

S. Install turning vanes in square throat elbows in supply and exhaust air systems, and elsewhere as indicated on the Drawings.

T. Install test hole fittings for making air readings, on both (opposite) sides of discharge duct from all supply and exhaust fans, at set dampers on supply and return branch ducts, and at other locations where shown on the Drawings for the proper adjusting and testing of the ventilating systems.

U. Install doors in built-up casing to open against system air pressure, with latches operable from both sides.

V. Coordinate as necessary to interface installation of ductwork accessories with other work.

3.4 FIELD QUALITY CONTROL

A. Manufacturer’s Services:

1. Provide a qualified, factory-trained service person to perform the following:
   a. Instruct Contractor in installing equipment.
   b. After installation, inspect and adjust equipment, verify proper operation, and assist with field testing.
   c. Instruct operations and maintenance personnel in operation and maintenance of the equipment.

3.5 ADJUSTING

A. All duct systems shall be tested, adjusted, and balanced per Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

B. Test openings shall be installed in the ductwork as directed by the testing, adjusting, and balancing Contractor. Test openings shall be sealed by a screw cap and gasket.

3.6 CLEANING

A. Thoroughly clean all ductwork and accessories prior to installation.

B. Remove all dirt, rust, dust, etc. from ductwork and accessories after installation.

C. Remove and dispose of all debris and waste from the Site resulting from installation.

D. Contractor to clean all existing ductwork.

3.7 PROTECTION OF EXECUTED WORK

A. Contractor to protect all occupied areas from working areas and clean-up/dispose of debris daily.

3.8 SCHEDULES

A. Minimum Duct Thicknesses:

1. As recommended in the HVAC DS for the pressure classification, reinforcement and support spacing.

2. As per 2020 NYSMC, Section 510.9 Table 510.9.

B. All ductwork and plenums serving the following equipment/spaces shall be aluminum:

1. HH –1st Floor Locker Rooms: Exhaust ductwork. Refer to drawings HH-M105

C. All ductwork serving the following equipment shall be galvanized steel:

1. All ductwork other than HH –1st Floor Locker Rooms.

END OF SECTION

SECTION 23 34 23

HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install HVAC Power Ventilators complete and operational with accessories. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

2. This section includes:
   a. Direct Drive Roof Downblast Centrifugal Exhaust Fans
   b. Centrifugal Corrosion And Hazardous Explosion Resistant Exhaust Fan

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the HVAC Power Ventilators Work.

2. Notify other Contractors in advance of the installation of HVAC Power Ventilators to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before, the HVAC Power Ventilators Work.

C. Related Sections:

1. Section 23 05 53, Identification for HVAC Piping and Equipment.

2. Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

3. Section 23 09 23, Direct-Digital Control System for HVAC.

1.2 REFERENCES

A. Air Movement and Control Association International, Inc. (AMCA).

1. AMCA Standard 99-2408 – Operating Limits for Centrifugal Fans.

2. AMCA Standard 204 – Balance Quality and Vibration Levels for Fans.

3. AMCA Standard 210 – Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating.

4. AMCA Standard 301 – Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

B. American Society for Testing and Materials (ASTM).

1. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.

C. Institute of Electrical and Electronic Engineers (IEEE).

D. National Electrical Code (NEC).

E. National Fire Protection Association (NFPA).

1. NFPA 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems.

F. Underwriters Laboratories Inc. (UL).

1. UL 705 – Power Ventilators.

1.3 QUALITY ASSURANCE

A. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single HVAC Power Ventilator manufacturer.

2. Require the HVAC Power Ventilator manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall equipment assembly by the HVAC Power Ventilator manufacturer.

B. Regulatory Requirements:

1. National Electrical Code (NEC).

2. National Fire Protection Association (NFPA).

3. Underwriters Laboratories Inc. (UL).

4. Local and State Building Codes and Ordinances.

5. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

C. Certifications:

1. HVAC Power Ventilators shall bear an approved label with all the necessary identification marks, electrical data, and any necessary cautions as required by the National Electric Code.

2. HVAC Power Ventilators shall be AMCA certified.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Drawings showing fabrication methods, assembly, accessories, installation details, and wiring diagrams.
   b. Setting drawings, templates, and directions for the installation of roof/equipment curbs, anchor bolts, and other anchorages.

2. Product Data:
   a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all equipment.
   b. Complete component list.
   c. Detailed description of each component.
   d. Catalog cut sheets for each component.
   e. Fan performance curves with operating points.
   f. Standard and custom color selection charts for finishing system.
   g. Lubricant Specification: Furnish lubricant specification for type and grade required for equipment furnished.
   h. Deviations from Contract Documents. Any exceptions to the Contract Documents must be clearly defined. Contractor shall be responsible for any additional expenses that may occur due to any exception made.
   i. Other technical data related to specified material and equipment as requested by Engineer.

3. Testing Plans, Procedures, and Testing Limitations:
   a. Plan for performing required field testing.

B. Informational Submittals: Submit the following:

1. Certificates:
   a. Certification of painting systems, in accordance with "Finishing" Article in this Section.
   b. Independent certification reports:
      1) UL Label or equal.
      2) AMCA certification.

2. Manufacturer Instructions:
   a. Instructions and recommendations for handling, storing, protecting the equipment.
   b. Installation Data.

c. Instructions for handling, start-up, and troubleshooting.

3. Source Quality Control Submittals:
   a. Written report presenting results of required shop testing.
   b. Factory test reports.

4. Field Quality Control Submittals:
   a. Written report presenting results of required field testing.

C. Closeout Submittals: Submit the following:

1. Operations and Maintenance Data:
   a. Submit complete Installation, Operation and Maintenance Manuals, including, test reports, maintenance data and schedules, description of operation, and spare parts information.

2. Warranty Documentation:
   a. General warranty.
   b. Special warranties on materials and equipment.

D. Maintenance Material Submittals: Furnish the following:

1. Spare Parts:
   a. Spare parts list and recommended quantities.

2. Extra Stock Materials:
   a. Touch up paint for each unit.

3. Tools:
   a. Two sets of special tools, if any, required for normal operation and maintenance.

4. Spare parts, extra stock materials, and tools shall be packed in sturdy containers with clear indelible identification markings and shall be stored in a dry, warm location until transferred to the Owner at the conclusion of the Project.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

2. Comply with manufacturer’s recommendations for rigging of equipment.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive Owner of other rights or remedies Owner may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under the Contract Documents. The obligations of Contractor under the Contract Documents shall not be limited in any way by the provisions of the specified special warranty.

B. Special Warranty on Materials and Equipment:

1. Provide manufacturer's written warranty, running to the benefit of Owner, agreeing to correct, or at option of Owner, remove or replace materials or equipment specified in this Section found to be defective during a period of 1 year after the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EQUIPMENT PERFORMANCE

A. Design Criteria:

1. Design conditions shall be as indicated on the Equipment Schedule.

2. Fans shall conform and be certified to UL 705.

3. Fan bearings shall be rated for a minimum L-10 life of 100,000 hours at the fan's maximum operating speed in accordance with ABMA 9 or 11.

4. Fans shall be balanced in accordance with AMCA Standard 204.

B. Performance Criteria:

1. Minimum performance data for each unit shall be as indicated on the Equipment Schedule. Provided equipment shall not exceed scheduled total power.

2. Fans shall be performance rated in accordance with AMCA Standards 210, 300, and 301.

2.2 DETAILS OF EQUIPMENT

A. Direct Drive Roof Upblast Centrifugal Exhaust Fans

1. Product and Manufacturer: Provide one of the following:
   a. Model CUE, as manufactured by Greenheck.
   b. Or equal.

2. Construction
   a. Housing: One-piece, spun aluminum windband continuously welded to curb cap.
   b. Base: Prepunched mounting holes for easy attachment to roof curb.
   c. Cooling: Cooling fins on top of fan wheel draw outside air through a breather tube into the motor compartment.

3. Housing Supports and Drive Frame:
   a. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators.

4. Vibration Isolation:
   a. Vibration Isolation: Double-studded isolators for true vibration isolation.

5. Impeller:
   a. Type: Backward-inclined centrifugal wheel
   b. Material: Composite

6. Motors:
   a. Electronically Commutated Motor
   b. Motor enclosure: TENV
   c. Motor to be a DC electronic commutation type motor (ECM) specifically designed for fan applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3 phase induction type motors
   d. Motors are permanently lubricated, heavy duty ball bearing type to match with the fan load and pre-wired to the specific voltage and phase
   e. Internal motor circuitry to convert AC power supplied to the fan to DC power to operate the motor.
   f. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by potentiometer dial mounted at the motor for balancing and on/off controlled by BMS via motor starter interlock.

7. Accessories
   a. Bird Screens: Galvanized steel mesh screen securely anchored to housing, 84% free area.

b. Disconnecting Switch: Each roof type exhauster with 2-horsepower or smaller motor shall be provided with a disconnecting switch in general purpose enclosure mounted inside of the housing near the motor. Wiring between motor and switch shall be installed by the fan manufacturer in 1/2" (minimum size) Greenfield conduit. Disconnect switch shall be positioned in a location easily accessible for field connection of service wiring. Conduit outlet from switch shall be 3/4".
c. Motorized Dampers: Refer to Section 23 31 00 HVAC Ducts and Casings.

2.3 CONTROLS

A. Refer to control drawings and Section 23 09 23, Direct-Digital Control System for HVAC for controls schematics and sequence of operations.

2.4 IDENTIFICATION

A. All equipment and component identification shall be provided in accordance with Section 23 05 53, Identification for HVAC Piping and Equipment.

B. All electrical wiring shall be color-coded and labeled for simplified identification. Power wiring shall be coded per Owner standards.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.2 PREPARATION

A. Protection of Surrounding Areas/Surfaces:

1. Openings and penetrations shall be capped to protect the building from outside conditions.

2. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.3 INSTALLATION

A. General:

1. Install the equipment in accordance with the Contract Documents and by manufacturer's instructions and recommendations. Obtain written interpretation from Engineer in the event of conflict between manufacturer's instructions and recommendations and the Contract Documents.

2. Install in accordance with Laws and Regulations.

3. Do not modify structures to facilitate installation of equipment, unless approved in writing by Engineer.

4. Installation to conform to requirements of all local and state codes.

5. Curb mounted fans shall be provided with enough electrical wiring and conduit slack to allow the fan to be removed from the curb without disconnecting the electrical wiring at the fan.

B. Install vibrator isolators.

3.4 FIELD QUALITY CONTROL

A. Field Tests:

1. After equipment installation is complete, Contractor and a qualified field service representative of unit manufacturer shall perform an operating test of each unit and associated controls, in presence of Engineer. Equipment will pass the test when each unit and its controls are demonstrated to function correctly.

2. Running Tests:
   a. Field-test each equipment together with its controls and appurtenances. Tests shall demonstrate to Engineer that each part and all parts together function in accordance with the Contract Documents. Provide all necessary testing equipment, labor, and appurtenances.
   b. Verify that equipment operates at design point as intended, that vibration limits are not excessive and beyond manufacturer's recommendations, and that equipment operates smoothly without excessive noise, temperature rise, or other defects, across entire range of operating curve. Verify that all controls work as intended in both manual and automatic mode.
   c. If equipment does not comply with the Contract Documents and does not pass the tests, Contractor shall adjust, modify, and retest the equipment as often as necessary until tests are successfully passed.

3.5 ADJUSTING

A. Adjust all controls for proper settings.

B. While system is operable, balance all equipment to achieve design conditions.

3.6 CLEANING

A. Thoroughly clean all equipment and accessories prior to installation.

B. Remove all dirt, rust, dust, etc. from equipment and accessories after installation.

C. Remove and dispose of all debris and waste from the Site resulting from installation.

3.7 COMMISSIONING OF HVAC POWER VENTILATORS

A. HVAC Contractor shall comply with the Commissioning Requirements of Contract Specification Section 23 08 00, Commissioning of HVAC.

END OF SECTION

SECTION 23 34 43

VEHICLE EXHAUST EXTRACTION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install Vehicle Exhaust Extraction System complete and operational with accessories. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. This section includes:

1. Complete vehicle exhaust extraction system for removing tailpipe emissions from indoor facilities (bus maintenance). The system comprises overhead exhaust hose reels, a wall-mounted exhaust fan, ductwork, controls, and accessories to capture vehicle exhaust at the source and discharge it safely outdoors. All major components – including spring-operated hose reel(s), flexible high-temperature hose, fan/blower, mounting hardware, fittings, control panel, and exhaust stack – are included.

1.2 COORDINATION

A. Notify other Contractors in advance of the installation of Vehicle Exhaust Extraction System to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before, the metal ductwork Work.

1.3 RELATED SECTIONS:

A. Section 23 05 29, Hangers and Supports for HVAC Piping and Equipment

B. Section 23 05 53, identification for HVAC Piping and Equipment.

C. Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

1.4 REFERENCES

A. AMCA Standard 99: Classification for Spark Resistant Construction (fan Type B spark-resistant requirements)

B. NFPA 91: Standard for Exhaust Systems for Air Conveying Vapors, Gases, Mists (general guidelines for design of exhaust systems).

C. UL 705: Standard for Power Ventilators (applicable to exhaust fan construction and motor).

D. NEC (NFPA 70): National Electrical Code – for electrical components and wiring of motors/controls.

E. OSHA Regulations: 29 CFR 1910 – ventilation requirements to maintain safe carbon monoxide levels in work areas (by removing vehicle exhaust).

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
    a. Engage an experienced installer to perform the work of this Section who has specialized in installing Vehicle Exhaust Extraction System similar to that required for this Project and who is acceptable to manufacturer.
    b. Manufacturers shall have at least 5 years of successful experience producing similar vehicle exhaust extraction systems.
    c. Installation shall be performed by a qualified HVAC or mechanical contractor experienced in installing vehicle exhaust removal or similar HVAC systems. Installer must follow manufacturer's installation instructions and obtain any required factory training for the hose reel and fan equipment.

B. Codes and Standards Compliance: The exhaust extraction system and its installation shall comply with applicable building codes and mechanical codes. Fan assemblies shall be AMCA labeled for spark-resistant construction Type B and motors shall be UL-listed. All components in the airstream (fan wheel, duct) shall be of non-ferrous or spark-resistant materials per AMCA standards for safety.

C. Pre-Installation Meeting: Conduct a meeting with the Contractor, Owner's representative, and Manufacturer's rep to verify installation details, coordination with electrical and structural supports, and to review the sequence of operations of the system.

1.6 REGULATORY REQUIREMENTS:

A. National Electrical Code (NEC).

B. National Fire Protection Association (NFPA).

C. Underwriters Laboratories Inc. (UL).

D. Local and State Building Codes and Ordinances.

E. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

1.7 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Drawings showing fabrication methods, assembly, accessories, and installation details.
   b. 1/4-inch scale duct layouts, dimensioned to show length of runs, sizes, support spacing and expansion provisions.
   c. Detailed installation drawing of each individual component showing:
      1) Mounting requirements.
      2) Locations.
   d. Setting drawings, templates, and directions for the installation of anchor bolts and other anchorages.

2. Product Data - General:
   a. Manufacturer's literature, illustrations, specifications, weight, wall thicknesses, design pressures, dimensions, required clearances, materials of construction, and performance data for all equipment.
   b. Complete component list.
   c. Detailed description of each component.
   d. Catalog cut sheets for each component.
   e. Deviations from Contract Documents. Any exceptions to the Contract Documents must be clearly defined. Contractor shall be responsible for any additional expenses that may occur due to any exception made.
   f. Other technical data related to specified material and equipment as requested by Engineer.

3. Product Data – Vehicle Exhaust Extraction System:
   a. Submit manufacturer's product literature for exhaust fan, hose reels, flexible hose, tailpipe adapters, controls, and all accessories. Include performance data (CFM, static pressure, horsepower, electrical requirements) for the fan and system.

B. Informational Submittals: Submit the following:

1. Manufacturer Instructions:
   a. Instructions and recommendations for handling, storing, protecting the equipment.
   b. Installation Data.

2. Source Quality Control Submittals:
   a. Factory test reports.

3. Field Quality Control Submittals:
   a. Written report presenting results of required field testing.

4. Supplier Reports:
    a. Submit written report of results of each visit to Site by Supplier's service personnel, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.

5. Qualifications Statements:
    a. Installer, when requested by Engineer.

C. Closeout Submittals: Submit the following:

1. Record Documentation:
    a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of the Work, submit "pdf" of CADD drawings showing the actual in place installation of all ductwork and equipment installed under this Section at a scale satisfactory to the Owner. The drawings shall show all ductwork on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the systems. Two paper prints shall also be furnished. The prints and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.8 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

2. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of that Work.

3. Comply with manufacturer's recommendations for rigging of equipment.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.9 WARRANTY:

A. Provide manufacturer's standard warranty for the vehicle exhaust extraction system. Warranty shall cover materials and workmanship for a minimum of one (1) year from date of installation (or as extended by the manufacturer). This includes the fan motor, hose reel mechanism (spring), flexible hose, and all provided controls/accessories. During the warranty period, any defects shall be repaired or replaced at no cost to the Owner. Transfer all warranty documents and points of contact to the Owner prior to final acceptance.

1.10 SITE CONDITIONS

A. Existing Conditions:

1. The Contract Documents show the general arrangement and extent of the Work to be done. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work is governed by the general building plans and the actual building conditions.

2. The Drawings are intended as an indication of the arrangement of equipment and ductwork and are as nearly correct as can be determined in advance of the actual construction of the Work. Equipment, ductwork, and appurtenances found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. System Description:

1. Provide a complete overhead vehicle exhaust extraction system designed to capture exhaust fumes directly from vehicle tailpipes and expel them outdoors, ensuring a safe indoor environment. The system is a spring-retractable hose reel system with flexible high-temperature hose that connects to vehicle tailpipes, a centrally connected exhaust blower/fan that creates the required suction, and ductwork leading to an exterior exhaust stack. The system is capable of serving two (2) exhaust hose drops simultaneously (for two vehicles) via one fan and duct network, as shown on the drawings. The basis of design is Fume-A-Vent's spring-operated hose reel system for bus/heavy vehicle maintenance facilities.

2. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case and adequately provide for expansion and minimize the amount of space required for the same.

3. The Drawings do not show all offsets, fittings, accessories and details, which may be required. Contractor shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work “by others,” to complete the systems to the true extent of the Contract Documents.

B. Design Criteria:

1. Temperature Rating: Flexible hoses and all in-line components shall be rated for continuous exposure to exhaust gas temperatures up to 600°F (315°C) without damage. Hose material shall be silicone-coated fiberglass or Nomex to withstand high temperatures from diesel exhaust.

2. Spark Resistant Construction: All fan components in contact with the airflow (impeller, housing interior) shall be spark-resistant (AMCA Type B) aluminum or non-ferrous construction to eliminate ignition hazards from exhaust particulates.

3. Exhaust Points: Provide two hose reel drops, each with a 6-inch diameter hose and nozzle, to serve two service bays. The system shall be capable of operating one or both drops at a time without reducing capture effectiveness beyond acceptable levels. Include any required balancing or splitter fittings so that flow is properly distributed.

4. Electrical Requirements: Motors and controls shall be suitable for standard HVAC power. Fan motor shall be rated for 460 V, 3-phase, 60 Hz and sized per the fan performance. Control panel components (switches, relays) shall be rated for the motor load and supply voltage. All electrical work shall comply with the NEC.

5. Noise Level: Fan shall include dynamic balancing and vibration isolation as needed to ensure noise and vibration are minimized. The assembly should operate at a noise level not exceeding 85 dB at 5 feet (to provide a safe work environment), or per local noise criteria.

6. Factory Sizing: The entire system (fan, hose diameter/length, duct size) shall be designed and sized by the manufacturer based on the application requirements, to ensure compatibility and performance. The basis-of-design system meets these criteria; any substitution must meet or exceed the same performance parameters.

2.2 MANUFACTURERS

A. Basis of Design: Fume-A-Vent (Air Cleaning Specialists, Inc.) – spring-operated hose reel system with matching fan and accessories as scheduled.

B. Approved Equal Manufacturers: Products by alternate manufacturers are acceptable provided they meet the requirements of this specification.

2.3 DETAILS OF MATERIALS

A. All components shall be factory-fabricated, matched, and compatible. Mixing of manufacturers for major components shall not be accepted to ensure single-source responsibility. Key system components include:

1. Exhaust Fan (Tailpipe Exhaust Blower): A wall-mounted centrifugal fan, direct-drive type. Fan shall be housed in cast aluminum or heavy-gauge steel with corrosion-resistant coating. The impeller shall be aluminum (spark-resistant) and statically and dynamically balanced. The fan shall be of pressure blower design capable of overcoming high static pressure; for example, a cast aluminum pressure blower with radial blades. Provide an outlet flange or adapter to connect to the exhaust stack or duct. The fan unit shall be AMCA Type B spark resistant. The motor shall be a TEFC (Totally Enclosed Fan-Cooled) induction motor, continuous duty, rated for the specified HP and voltage. Motors must be UL and CSA approved and run at ~3450 RPM for direct-drive as required. The fan/motor assembly may be direct-mounted to the hose reel duct system or connected via duct; in this design, it is mounted on an exterior wall shelf (see accessories) and connected by duct to the hose reels. Include an integral backdraft damper on the fan outlet or at the stack termination to prevent backflow when the fan is off.

2. Hose Reels: Provide spring-operated hose reels designed for vehicle exhaust extraction. Each reel shall accommodate a flexible exhaust hose of 6-inch diameter and at least 20 feet length as scheduled. Reels shall be constructed of heavy gauge steel drum and side discs, factory-coated for corrosion resistance. The reel mechanism shall include a spring rewind cassette that automatically retracts the hose. A positive lock-and-latch mechanism shall be provided to lock the reel at the desired hose extension and prevent recoil until released by the user. The reels must have a built-in hose stop bumper to prevent the hose from retracting completely out of reach. Hose reel shall have a hose-to-drum connection fitting for the hose, and a swivel or stationary inlet that connects to the vertical drop duct. The inlet/outlet of the reel shall match the hose diameter (6”) and connect to ductwork with a secure gasketed connection. Reels are to be ceiling-suspended (dropped from structure) as indicated, but capable of wall or ceiling mounting.

3. Flexible Exhaust Hose: High-temperature fabric hose of 6″ diameter by 20′ length on each reel. Hose shall be Type 2 high-temp silicone/Nomex or equivalent, rated for 600°F continuous exposure (able to withstand diesel exhaust surges). The hose interior and exterior shall be resistant to exhaust chemicals and shall not corrode or deteriorate with exposure to hydrocarbons. It shall be crush-resistant and reinforced with a spring steel wire helix or similar to prevent collapse under suction. Hose shall comply with NFPA 1500 requirements for fire-resistance if used in fire stations (or general flame-resistance for safety). Connections of hose to reel and to adapter shall be secured with band clamps or flange fittings per manufacturer’s design. Include hose stop bumpers on each hose end to stop retraction at the desired point.

4. Tailpipe Adapter (Nozzle): Provide stainless steel tapered cone adapters for connecting the hose to vehicle tailpipes. Adapter size shall accommodate a range of tailpipe diameters (typical adapter from ~4″ tailpipe to 6″ hose). The adapter/nozzle shall be made of 304 stainless steel for durability and heat resistance. It shall be conical or funnel-shaped to easily fit over the vehicle's tailpipe. Each adapter to include a "Vice Grip" style clamp (VG option) or equivalent positive locking device to secure the nozzle onto the tailpipe during use. The clamp should be easy to attach and release by hand but hold firmly to prevent the nozzle from slipping off. When not in use, a plug or cap may be inserted in the adapter to prevent debris entry (if provided by manufacturer). Nozzle model TPA (Tapered Pipe Adapter) as per basis of design, sized for 4″ to 6″ pipes, or manufacturer's standard recommendation for the vehicles served.

5. Ductwork and Fittings: All ductwork from the hose reel inlets to the fan and from fan to the discharge shall be provided as part of the system. Use 6″ diameter round duct (or larger as required for manifold sections) made of 20-gauge stainless steel for corrosion resistance. Joints shall be slip-fit with factory-installed EPDM gaskets or clamp-together duct for quick assembly. This self-sealing duct system (such as Nordfab or similar) ensures tight joints without field sealants and allows reconfiguration if needed. Include all elbows, Y-branches (if two reels connect to one fan inlet), and connectors as needed. Branch fittings shall be smooth interior (long radius elbows, wyes instead of tees) to minimize pressure drop. All ductwork shall be airtight to prevent fumes escaping into the building. Provide an exhaust discharge stack extending to the outdoors: if through roof, extend vertically above roof with rain protection; if through wall, extend out with a weather hood or turn upwards. The exterior stack/vent shall terminate at least 10 ft away from any air intakes and above the roof line or as required by code. Construct the stack of stainless or galvanized steel and include a rain cap or backdraft damper at the termination to prevent water entry and backflow when fan is off. Support all duct sections per SMACNA standards (from structure or wall as appropriate).

6. Controls: Furnish a complete control panel for operating the exhaust fan (and the motorized reel if it were motorized, though here reels are spring type). The control panel shall be an OEM supplied panel mounted near the hose reels or fan (or a remote switch station as indicated). At minimum, provide a manual ON/OFF selector switch for the exhaust fan motor, with an integral pilot light to indicate when the fan is running (optional but recommended for safety). The panel shall include a motor starter with thermal overload protection sized for the fan motor, unless the motor is small enough to be allowed manual starter per code. Include an emergency stop if required by local code. All control circuitry and enclosures shall be NEMA rated for the environment (NEMA 1 for indoors, or NEMA 3R if exposed to weather). The control panel is to be wired to the fan motor and to an electrical disconnect (disconnect by Division 26 – provided by electrical contractor, but coordinate mounting). If specified, include an automatic timer (to shut fan off after a set time) or interlock (for example, start fan when hose reel is pulled down – if a mechanical switch is on the reel). For simplicity, basis-of-design includes a manual start/stop control box by Fume-A-Vent. All wiring and conduit for controls to be installed per Division 26 – coordinate requirements.

7. Mounting Hardware and Supports: Provide all accessories for mounting the system components securely. This includes a fabricated metal shelf or bracket for supporting the exhaust fan on the exterior wall. The shelf shall be galvanized or painted steel, engineered to carry the fan's weight and vibration, and anchored to the building wall structure (masonry or concrete anchors, or structural framing as appropriate). Inside, provide Unistrut steel hanger supports for suspending the hose reel from the roof/ceiling structure. Use 1/2″ threaded rods and Unistrut channels or brackets to drop the reel to the desired height (the reel should be at a height that the hose nozzle can reach the vehicles, typically adjustable based on bay size). All threaded rod, nuts, and hardware should be zinc plated or galvanized. Include vibration isolation pads or mounts for the fan if recommended by manufacturer (to reduce noise transmission through the wall). Also provide any special fittings: for example, a flexible connector between fan and duct (to isolate vibration), and wall thimble or roof curb/flashing kit for the stack penetration to ensure a weather-tight installation.

8. Miscellaneous Components: Hose lifting ropes or cable (if part of reel design), hose saddles or guides, tailpipe adapter holders (holsters) to store the nozzle when not in use, etc., should all be provided as needed for a complete system. Any quick-connect coupling or damper required in the duct system (for example, if each drop has a gate that opens when hose is lowered) shall be included per manufacturer's standard design.

B. All components shall be factory finished. The fan and reel shall come painted (safety yellow or another standard color) or powder-coated; touch up any scratched surfaces with manufacturer's paint. Duct shall be mill finish stainless. Provide consistent and compatible materials to prevent galvanic corrosion (stainless duct with stainless fasteners). Entire system is to be "factory-built" and modular to the greatest extent, assembled on site per manufacturer instructions.

2.4 IDENTIFICATION

A. All equipment and component identification shall be provided in accordance with Section 23 05 53 – Identification for HVAC Piping and Equipment.

2.5 SOURCE QUALITY CONTROL

A. Shop Tests:

1. Equipment shall be completely manufactured and pre-assembled in accordance with Reference Standards. Perform the following tests and inspections at factory before shipment:
   a. Tested and inspected for approval as a unit by Underwriters Laboratories Inc., UL Label or equal.
   b. Factory test equipment to ensure that the entire package has been properly fabricated and assembled, that all the controls function as specified herein and that the package meets the specified performance requirements including manufacturer's data report.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verification of Conditions: Before installation, verify that the building structure is ready to receive the exhaust system. Confirm that adequate structural support (ceiling beams, wall structure) is available at the planned mounting locations for the hose reel and fan. If structural members are not in optimal locations, coordinate installation of additional supports or framing as needed with general contractor if required due to the weight and dynamic load of the reel.

B. Ensure that the routing for ductwork is clear of obstructions and that penetrations for the exhaust stack (wall or roof) have been properly prepared. Verify the correct location and size of any wall opening for the fan outlet or duct – it should match the fan outlet diameter and be at the correct height for the wall-mounted shelf.

C. Check that electrical power of the correct voltage and phase is available at the fan control panel location. The Division 26 contractor should have installed a disconnect switch (lockable type) within sight of the fan motor. Do not proceed with equipment installation until any conflicting trades (electrical, structural, architectural) have been coordinated.

D. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.2 PREPARATION

A. Protection of Surrounding Areas/Surfaces:

1. Openings and penetrations shall be capped to protect the building from outside conditions.

2. Properly cap the open ends of all ductwork at the end of each day's Work or other stopping point throughout the construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.3 INSTALLATION

A. General:

1. Install the equipment in accordance with the Contract Documents and by manufacturer's instructions and recommendations. Obtain written interpretation from Engineer in the event of conflict between manufacturer's instructions and recommendations and the Contract Documents.

2. Install in accordance with Laws and Regulations.

3. Do not modify structures to facilitate installation of equipment, unless approved in writing by Engineer.

4. Installation to conform to requirements of all local and state codes.

B. Hose Reel Installation: Install the spring-operated hose reels at the locations shown on drawings and coordinated with Owner. Mount reels suspended from the roof structure using Unistrut channels and threaded rods. Secure the Unistrut to structural members (joists or trusses) with appropriate clamps or hangers. Use 1/2″ diameter threaded rod to drop the reel to the desired height; ensure rods are plumb and adequately braced to prevent sway. Lock nuts on threads to secure the elevation. The reel must be level and the axis horizontal so the hose winds evenly. Provide clearance around the reel for the hose to unwind freely without rubbing on structural elements or other equipment. If a wall-mounted configuration is used, bolt the reel's mounting bracket to the wall structure using anchor bolts as recommended by manufacturer. Important: Ensure the reel's spring is in the locked position during installation for safety (prevent accidental retraction). Follow manufacturer's guidelines for any pre-tensioning of the spring or attachment of the hose stop.

C. Fan Installation: Mount the exhaust fan on the exterior wall shelf provided. Anchor the shelf strongly: use through-bolts on concrete walls or structural bolts into steel framework as applicable, so it can carry the fan weight and vibration. Place vibration isolation pads between the fan base and the shelf. Bolt the fan to the shelf or support brackets per manufacturer instructions. The fan inlet/outlet orientation should align with the duct connections – typically the fan inlet will connect to the interior duct coming from the reels (through the wall via a short duct section or wall thimble). Install any inlet adapter or transition piece on the fan inlet if needed to mate with the duct size. Attach the duct from indoor hose reel(s) to the fan inlet securely with the gasketed slip-fit or flange connection – ensure a tight seal (use clamps or draw-bands provided). The fan outlet will connect to the vertical stack; attach the stack section or elbow to the fan outlet flange, again ensuring a proper gasket or sealant as required by the manufacturer. Support the vertical stack above the fan so that the fan outlet isn't bearing the weight of long duct runs – use wall brackets or roof supports for the stack. Verify that the fan wheel spins freely and that no installation debris is left inside.

D. Ductwork Installation: Install the stainless steel ductwork between the hose reel(s) and the fan. If two reels are provided and join into one fan, install the Y-branch or manifold as shown – typically a 6″+6″ to 8″ wye that combines the two 6″ reel ducts into an 8″ main to the fan (sized per manufacturer's design). Seal all joints with the supplied EPDM gasketed connections or with high-temp silicone sealant if a traditional slip joint. Use sheet metal screws or clamp bands at joints if recommended (some clamp-together systems require only the clamps). Slope horizontal runs slightly to avoid condensate traps, or provide drain if moisture could condense. Provide supports for duct at intervals per SMACNA (approximately every 6-8 feet for this size) – hang from structure with strap hangers or additional Unistrut supports. Ensure the exhaust stack is installed per plans: for a roof exhaust, flash the penetration properly (coordinate with roofing contractor to install a roof curb or flashing kit). Extend the stack to the required height (for example, 3 feet above roof or as code requires) and install the rain cap or exhaust hood. For a sidewall exhaust, install the exterior vertical section and cap as detailed. Secure the stack with wall brackets to resist wind. Paint or finish any exterior duct if required by the project (or use stainless for maintenance-free finish). Finally, verify that the entire duct path is airtight and that there are no sharp bends that could collapse the hose or duct – correct any kinks or alignment issues.

E. Controls and Wiring: Mount the system's control panel (on/off switch panel) at the location indicated on the drawings. The electrical contractor shall complete conduit and wiring runs: from the panel to the fan motor (power wiring) and from panel to power source/disconnect. Coordinate so that the motor is properly wired for the correct voltage and rotation. Verify motor rotation before final use – a three-phase motor can run backward; correct the phasing if needed so that the fan pulls air correctly. Secure all control boxes and conduit. If any interlock devices are used (for example, a micro-switch that starts the fan when the hose is lowered), ensure they are installed and wired per manufacturer instructions – a reel-mounted switch that closes when the reel is in use, wired to the control circuit. All field wiring should be in accordance with Division 26 specifications. Label the control switch "VEHICLE EXHAUST FAN" for identification. Coordinate with electrical contractor to provide an appropriately sized circuit breaker or fuse for the fan motor.

F. Accessories Installation: Install the tailpipe adapter nozzles at the end of each hose. Typically, the adapter is clamped onto the hose end with a band clamp. Ensure a tight fit so no leaks occur at this junction. If the adapter includes a damper or spring-loaded closure, check its operation. Provide any hanging strap or holder to store the nozzle when not in use (some systems have a bracket on the wall or reel to clip the nozzle). If provided, attach the rope/cable retrieval system or pulley (for guiding the hose) according to manufacturer instructions. Confirm that the hose stop is adjusted so the nozzle hangs at a convenient height for users to grab (usually chest height when retracted).

G. Coordination: Coordinate with other trades: If overhead doors or cranes are nearby, ensure the hoses and reels do not interfere. If the reels are near lights or sprinklers, maintain required clearances. Work with the electrical installer so that the disconnect switch is in line of sight of the fan (per code) and not blocked by the duct or other items. Before finishing, double-check that all components are tightly fastened: all anchor bolts torqued, all duct clamps tight, fan bolts secure, etc.

H. Install ductwork to allow maximum headroom. Properly seam, brace, stiffen, support and render ducts mechanically airtight. Adjust ducts to suit job conditions. Dimensions may be changed as approved, if cross sectional area is maintained.

3.4 FIELD QUALITY CONTROL

A. Inspection: After installation, visually inspect the entire system. Verify that the hose reels are firmly mounted and that the hose can extend and retract without rubbing or catching. Check that all duct joints are sealed and that supports are in place at proper intervals. Ensure the fan is securely mounted and aligned, and that the fan wheel is not contacting the housing (turn by hand to check). Inspect the electrical connections in the control panel for correctness and tightness.

B. Operational Testing: Engage a qualified technician to perform startup and testing of the exhaust fan and system. Turn the system ON via the control switch and observe operation. Check the fan motor amperage draw and compare to nameplate (should not exceed full load amps). Verify there are no unusual vibrations or noises; a slight airflow noise is normal, but banging or scraping indicates a problem (shut down immediately if so). Test the airflow at each hose drop – with the fan running, feel for strong suction at the nozzle. You may use an anemometer or velometer to measure airflow at the hose inlet. Each drop should pull roughly the design CFM (500 CFM each if two open, or higher if one open). If balancing dampers are present on each branch, adjust as necessary so both drops have similar flow when open. Also measure static pressure if possible at a test port near the fan to confirm it matches design (~4-6″ w.g.).

C. Smoke Test: As a demonstration of performance, you can conduct a smoke test or vehicle exhaust test. Briefly introduce a visible smoke source at a tailpipe (or run a vehicle for a short period) with the nozzle attached. Observe that all smoke/exhaust is drawn into the hose and discharged outside, with no leakage into the room. This confirms capture efficiency.

D. Leak Check: While the fan is running, inspect all duct and hose connections for leaks using smoke or by feel. Even a small leak of exhaust can be hazardous; tighten any joints or apply sealant/clamps to stop leaks. Also ensure the exterior discharge has no obstructions – the flap or cap should open freely under airflow.

E. Adjustments: If the hose retraction tension needs adjustment (some reels allow tuning the spring tension), adjust per manufacturer instructions so the hose retracts fully but is not too difficult to pull down. Make sure the lock/latch engages properly at incremental lengths. Adjust the hose stop bumper so the nozzle doesn't slam into the reel but also retracts high enough off the floor. Any fan belt (if belt-drive, though specified direct-drive) or set-screws should be checked and tightened.

F. Manufacturer's representative shall review the installation and participate in startup. Document the test results (airflow readings, etc.) and submit to the Engineer/Owner.

3.5 CLEANING

A. After successful testing, clean any debris or dust from the equipment. Wipe down the hose exterior and fan housing to remove grease or fingerprints. Ensure the interior of hoses and duct is free of construction debris (no plastic, rags, etc., left inside). Remove any temporary tape or caps that were used during construction.

B. Protect the installed hose reels and fan from damage if further construction work is ongoing nearby. If painting or other overhead work will be done, cover the reels and hoses with plastic to prevent overspray or sparks from welding from contacting the hoses. Do not operate the system in the presence of drywall sanding or other debris-generating activities without temporarily covering the fan inlet, to avoid fouling the motor or impeller.

C. Replace any scratched or marred paint on equipment with touch-up paint provided by manufacturer. Ensure labels (like “No Smoking – Exhaust System” if any, or identification tags) are intact and legible.

3.6 PROTECTION OF EXECUTED WORK

A. Contractor to protect all occupied areas from working areas and clean-up/dispose of debris daily.

3.7 DEMONSTRATION AND TRAINING

A. Once the system is fully operational and tested, provide a training session for the Owner’s maintenance staff and end-users (mechanics, etc.). This training shall include:

1. Demonstration of Operation: Show how to properly pull the hose from the reel (by grasping the nozzle or handle, releasing the reel lock if applicable) and attach the nozzle securely to a vehicle’s tailpipe. Demonstrate the vice-grip clamp on the tailpipe adapter and how to ensure a good fit. Then operate the control switch to turn on the exhaust fan. Point out how the exhaust fumes are being captured. Emphasize any indicators (e.g. the pilot light on control panel) that show the system is running. Next, show how to disconnect the nozzle from the vehicle (after engine off), and how to release the reel latch to allow the hose to retract. Guide the hose smoothly back onto the reel, showing the proper technique to avoid whip. Ensure they see how the hose stop prevents the nozzle from whipping upwards.

2. Safety Considerations: Instruct users never to let the hose retract freely without guided control, and to keep clear of the recoil path. Explain the importance of turning on the fan before starting a vehicle indoors, and to let the fan run for a short time after engine shutdown to purge remaining fumes. Remind them that the hoses and metal parts may be hot right after use (600°F exhaust) so use gloves or caution if disconnecting immediately after a heavy run. Also, outline what the spark-resistant fan means – that even if flammable fumes are present, the fan design minimizes ignition risk. However, also caution to avoid running engines unnecessarily indoors even with the system.

3. Maintenance Training: Show maintenance staff how to inspect the system periodically. This includes checking the hoses for wear (no cracks, no excessive flattening), inspecting the adapter clamp condition, and cleaning the inside of the nozzle of soot buildup. Demonstrate how to safely lock out the fan (at the disconnect) before any maintenance on the fan motor. Explain lubrication requirements. However, any moving parts or pivots can be checked. If the system has filters or spark arrestors (not in this spec, but if any), show how to clean/replace them. Provide the O&M manuals and review the recommended inspection interval (often, check the hose and reels monthly, and the motor annually).

4. Troubleshooting: Inform how to recognize if the system is not performing (for example, if a hose is damaged and leaks – the suction will drop, or if the fan belt slips – if it were belt-drive – airflow drops, etc.). Advise to listen for unusual noises from the fan (could indicate need for service). Provide contact information for parts and service (the manufacturer or rep).

5. Spares: Hand over any spare parts supplied (e.g. extra fuses, an extra hose clamp, etc.) and indicate how to use them.

B. After training, the Owner’s personnel should be comfortable with operating the vehicle exhaust extraction system on a daily basis and performing basic maintenance. Document attendance and topics covered.

END OF SECTION

SECTION 23 72 00

PACKAGED OUTDOOR HEATING-ONLY MAKEUP-AIR UNITS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install packaged outdoor heating-only makeup-air units complete and operational with accessories. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the packaged outdoor heating-only makeup-air units Work.

2. Notify other Contractors in advance of the installation of packaged outdoor heating-only makeup-air units to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before, the packaged outdoor heating-only makeup-air units Work.

C. Related Sections:

1. Section 23 05 29, Hangers and Supports for HVAC Piping and Equipment

2. Section 23 05 53, Identification for HVAC Piping and Equipment.

3. Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

4. Section 23 09 23, Direct-Digital Control System for HVAC

5. Section 23 08 00, Commissioning of HVAC

1.2 REFERENCES

A. Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

1. AHRI 410 – Forced-Circulation Air-Cooling and Air-Heating Coils.

B. Air Movement and Control Association International, Inc. (AMCA).

1. AMCA Standard 210 – Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating.

2. AMCA Standard 500-D – Laboratory Methods of Testing Dampers for Rating.

3. AMCA Publication 511 – Certified Ratings Program - Product Rating Manual for Air Control Devices.

C. American Bearing Manufacturers Association (ABMA).

1. ABMA 9 – Load Ratings and Fatigue Life for Ball Bearings.

2. ABMA 11 – Load Ratings and Fatigue Life for Roller Bearings.

D. American Gas Association (AGA).

E. American National Standards Institute (ANSI).

1. ANSI Z21.47 – Gas-Fired Central Furnaces.

2. ANSI Z83.8 – Gas Unit Heaters, Gas Packaged Heaters, Gas Utility Heaters and Gas-Fired Duct Furnaces.

F. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

1. ASHRAE Standard 52.2 – Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

G. American Society for Testing and Materials (ASTM).

1. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.

2. ASTM D870 – Standard Practice for Testing Water Resistance of Coatings Using Water Immersion.

3. ASTM D1929 – Standard Test Method for Determining Ignition Temperature of Plastics.

4. ASTM D2247 – Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

H. National Electrical Code (NEC).

I. National Electrical Manufacturers Association (NEMA).

1. NEMA ICS 3.1 – Guide for the Application, Handling, Storage, Installation and Maintenance of Medium-Voltage AC Contactors, Controllers and Control Centers.

J. Underwriters Laboratories Inc. (UL).

1. UL 795 – Commercial-Industrial Gas Heating Equipment.

2. UL 900 – Air Filter Units.

3. UL 1995 – Heating and Cooling Equipment.

1.3 QUALITY ASSURANCE

A. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single packaged outdoor heating-only makeup-air unit manufacturer.

2. Require the unit manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall equipment assembly by the unit manufacturer.

B. Regulatory Requirements:

1. National Electrical Code (NEC).

2. National Fire Protection Association (NFPA).

3. Underwriters Laboratories Inc. (UL).

4. Local and State Building Codes and Ordinances.

5. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

C. Certifications:

1. Energy Recovery Equipment shall bear an approved label with all the necessary identification marks, electrical data, and any necessary cautions as required by the National Electric Code.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Drawings showing fabrication methods, assembly, accessories, installation details, and wiring diagrams.
   b. Detailed drawings of each individual component's wiring diagrams.
   c. Detailed drawings of control panel layout.
   d. Detailed installation drawing of each individual component showing:
      1) Mounting requirements including roof/equipment curbs.
      2) Locations (panel, field, etc.)
      3) Ductwork, piping, and wiring connections, labeled and coded.
   e. Setting drawings, templates, and directions for the installation of roof/equipment curbs, anchor bolts, and other anchorages.

2. Product Data:
   a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all equipment.
   b. Complete component list.
   c. Detailed description of each component.
   d. Catalog cut sheets for each component.
   e. Fan performance curves with operating points.
   f. Standard and custom color selection charts for finishing system.
   g. Lubricant Specification: Furnish lubricant specification for type and grade required for equipment furnished.
   h. Deviations from Contract Documents. Any exceptions to the Contract Documents must be clearly defined. Contractor shall be responsible for any additional expenses that may occur due to any exception made.
   i. Other technical data related to specified material and equipment as requested by Engineer.

B. Informational Submittals: Submit the following:

1. Certificates:
   a. Independent certification reports:
      1) UL Label or equal.
      2) AHRI Label.
      3) AGA Label or equal.

2. Manufacturer Instructions:
   a. Instructions and recommendations for handling, storing, protecting the equipment.
   b. Installation Data.
   c. Instructions for handling, start-up, and troubleshooting.

3. Source Quality Control Submittals:
   a. Written report presenting results of required shop testing.
   b. Factory test reports.

4. Field Quality Control Submittals:
    a. Written report presenting results of required field testing.
    b. Results of motor tests at the Site in accordance with Section 40 05 93, Common Motor Requirements for Process Equipment.

5. Supplier Reports:
    a. Submit written report of results of each visit to Site by Supplier's service personnel, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.

C. Closeout Submittals: Submit the following:

1. Operations and Maintenance Data:
    a. Submit complete Installation, Operation and Maintenance Manuals, including, test reports, maintenance data and schedules, description of operation, and spare parts information.

2. Warranty Documentation:
    a. General warranty.
    b. Special warranties on materials and equipment.

D. Maintenance Material Submittals: Furnish the following:

1. Spare Parts:
    a. Spare parts list and recommended quantities.
    b. One set of bearings for each belt drive fan.
    c. One set of belts for each belt drive.
    d. One set of filters for each unit.

2. Extra Stock Materials:
    a. Touch up paint for each unit.

3. Tools:
    a. Two sets of fin combs for each fin spacing required.

4. Spare parts, extra stock materials, and tools shall be packed in sturdy containers with clear indelible identification markings and shall be stored in a dry, warm location until transferred to the Owner at the conclusion of the Project.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Cover all openings into gear boxes with vapor inhibiting and water repellent material.

2. Deliver materials to the Site to ensure uninterrupted progress of the Work.

3. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of that Work.

4. Comply with manufacturer's recommendations for rigging of equipment.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 WARRANTY

A. General Warranty: The special warranties specified in this Article shall not deprive Owner of other rights or remedies Owner may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under the Contract Documents. The obligations of Contractor under the Contract Documents shall not be limited in any way by the provisions of the specified special warranties.

PART 2 - PRODUCTS

2.1 EQUIPMENT PERFORMANCE

A. Equipment Description:

1. Units shall be completely factory assembled and tested, internally wired, and equipped for outdoor installation. Unit shall consist of insulated weatherproof cabinet with dampers, filters, heating section, supply fans, motors and drives, outside air intake hood, and including all unit mounted controls, wiring and accessories.

2. Units shall be equipped with provisions for forklift or crane lifting and be designed structurally to withstand the stresses.

3. Factory fabricate and test units of sizes, capacities, and configuration as indicated and specified. Units shall be fully assembled on support members up to practical shipping limitations. On units not shipped fully assembled, manufacturer shall tag each section to indicate location and direction of airflow to facilitate assembly at the Site.

B. Design Criteria:

1. Design conditions shall be as indicated on the Equipment Schedule.

2. Units shall conform and be certified to the latest edition of UL 1995.

C. Performance Criteria:

1. Minimum performance data for each unit shall be as indicated on the Equipment Schedule. Provided equipment shall not exceed scheduled total power.

2.2 MANUFACTURERS

A. Manufacturer: Provide product of one of the following:

1. Greenheck

2. Or equal.

2.3 DETAILS OF CONSTRUCTION

A. Cabinet:

1. Materials: Formed, double wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.
   a. Internal assemblies: 24 gauge, galvanized (G90) steel except for motor supports which shall be minimum 14 gauge galvanized (G90) steel.

2. Cabinet Insulation: Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.
   a. Materials: Rigid urethane injected foam. Foam board not acceptable.
   b. Thickness: 2 inch (50.8 mm)
   c. Thermal Resistance R13
   d. Thermally broken
   e. Meets UL94HF-1 flame requirements.
   f. Location and application: Full coverage of entire cabinet exterior to include walls, roof of unit, unit base, and doors.

3. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
   a. Thickness: 2 inch (50.8 mm)

b. Thermal Resistance R8
c. Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.
d. Location and application: Divider panels between outdoor air and return air/exhaust air streams.

4. Roof Insulation: 2 inch (50.8 mm) fiberglass located above the 1 inch (25.4 mm) foam panel.

5. Access panels / doors: Unit shall be equipped with insulated, hinged doors or removable access panels to provide easy access to all major components. Doors and access panels shall be fabricated of 18 gauge galvanized G90 steel or painted galvannealed steel.

6. Supply Air blower assemblies: Blower assembly shall consist of an electric motor and direct-drive fans. Assembly shall be mounted on heavy gauge galvanized steel rails and further mounted on 1.125 inch thick neoprene vibration isolators. Blower motors shall be capable of continuous speed modulation and controlled by a VFD.

7. Control panel / connections: Units shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections. RTU shall be equipped with a Unit Disconnect Switch. Electric heater shall have single point power.

8. Electric Heater: Heater shall be SCR control and shall include a temperature sensor with field adjustable set point, located in the outdoor air stream. Heat output of the heater shall be infinitely variable.

9. Phase and brownout protection: Unit shall have a factory-installed phase monitor to detect electric supply phase loss and voltage brown-out conditions. Upon detection of a fault, the monitor shall disconnect supply voltage to all motors.

10. Motorized dampers / Intake Air, Motorized dampers of low leakage type shall be factory installed.

11. Curb Assembly: A curb assembly made of 14 gauge galvanized steel shall be provided by the factory for assembly and installation as part of this division. The curb assembly shall provide perimeter support of the entire unit. Curb assembly shall enclose the underside of the unit and shall be sized to fit into a recess in the bottom of the unit. Contractor shall be responsible for coordinating with roofing contractor to ensure curb unit is properly flashed to provide protection against weather/moisture penetration. Contractor shall provide and install appropriate insulation for the curb assembly. The curb shall be the height of 14 in. Horizontal connections through unit only. Plenum curb for horizontal connections is not acceptable.

12. Service receptacle: Unpowered 120 VAC GFCI service outlet shall be factory-provided and installed by EC. Service outlet requires a dedicated single phase electric circuit. Unit contains a 120 VAC transformer to provide power to service outlet.

B. Blowers:

1. Blower section construction, Supply Air: direct drive motor and blower shall be assembled on a 14 gauge galvanized steel platform and shall be equipped with 1.125 inch thick neoprene vibration isolation devices.

2. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

3. Fan: Direct drive, airfoil plenum fan with aluminum wheel statically and dynamically balanced. Prop or belt-drive fan not acceptable due to low static capabilities.

4. Blades: Welded aluminum blades only.

5. Blower section motor source quality control: Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, "Laboratory Methods of Testing Fans for Rating".

C. Motors:

1. General: Blower motors greater than 1/2 horsepower shall be "NEMA Premium" unless otherwise indicated. Compliance with EPAct minimum energy-efficiency standards for single speed ODP and TE enclosures is not acceptable. Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure.

2. Motors shall be 60 cycle, 3 phase 208 volts.

D. Variable Frequency Drives:

1. Motors shall be provided with a factory installed and wired variable frequency drive (VFD) where specified on the Equipment Schedule.

E. OEM Controls

1. The unit shall be constructed so that it can function as a stand-alone heating controlled by factory-supplied controllers, thermostats and sensors or it can be operated as a heating and cooling system controlled by a Building Management System (BMS). This unit shall be controlled by a factory-installed microprocessor programmable controller (DDC) that is connected to various optional sensors.

2. Unit shall incorporate a DDC controller with integral LCD screen that provides text readouts of status. DDC controller shall have a built-in keypad to permit operator to access read-out screens without the use of ancillary equipment, devices or software. DDC controllers that require the use of equipment or software that is not factory-installed in the unit are not acceptable. Alarm readouts consisting of flashing light codes are not acceptable. Owner-specified ventilating conditions can be input by means of pushbuttons.

3. Unit supply fan shall be configured for Variable Volume.

4. Dirty filter sensor shall be factory installed.

5. Operating protocol: The DDC shall be factory-programmed for BACNet/MSTP.

6. Variable Frequency Drive (VFD): unit shall have factory installed variable frequency drive for modulation of the supply air blower assemblies. The VFD shall be factory-programmed for unit-specific requirements and shall not require additional field programming to operate.

7. Airflow monitoring required in the supply airstream.

8. Unit shall be provided with a space thermostat measuring temperature. Thermostat shall have an LCD display and push buttons allowing for setpoint adjustments. 2 temperature sensors shall be provided for temperature averaging.

F. Filters:

1. Unit shall have permanent 2 inch (50.8 mm) aluminum filters located in the outdoor air intake and shall be accessible from the exterior of the unit. MERV 8 disposable pleated filters shall be provided in the supply air stream.

2.4 CONTROLS

A. Refer to control drawings and Section 23 09 23, Direct-Digital Control System for HVAC for controls schematics and sequence of operations.

2.5 IDENTIFICATION

A. All equipment and component identification shall be provided in accordance with Section 23 05 53, Identification for HVAC Piping and Equipment.

B. All electrical wiring shall be color-coded and labeled for simplified identification. Power wiring shall be coded per Owner standards.

2.6 SOURCE QUALITY CONTROL

A. Shop Tests:

1. Equipment shall be completely manufactured and pre-assembled in accordance with Reference Standards. Perform the following tests and inspections at factory before shipment:
   a. Tested and inspected for approval as a unit by Underwriters Laboratories Inc., UL Label or equal.
   b. Factory test equipment to ensure that the entire package has been properly fabricated and assembled, that all the controls function as specified herein and that the package meets the specified performance requirements including manufacturer's data report.
   c. Fan wheels and shafts shall be statically and dynamically balanced.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.2 PREPARATION

A. Protection of Surrounding Areas/Surfaces:

1. Openings and penetrations shall be capped to protect the building from outside conditions.

2. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.3 INSTALLATION

A. General:

1. Install the equipment in accordance with the Contract Documents and by manufacturer's instructions and recommendations. Obtain written interpretation from Engineer in the event of conflict between manufacturer's instructions and recommendations and the Contract Documents.

2. Install in accordance with Laws and Regulations.

3. Do not modify structures to facilitate installation of equipment, unless approved in writing by Engineer.

4. Installation to conform to requirements of all local and state codes.

3.4 FIELD QUALITY CONTROL

A. Field Tests:

1. After equipment installation is complete, Contractor and a qualified field service representative of unit manufacturer shall perform an operating test and a sound test of each unit and associated controls, in presence of Engineer. Equipment will pass the test when each unit and its controls are demonstrated to function correctly, and sound levels do not exceed maximum limits.

2. Running Tests:
   a. Field-test each equipment together with its controls and appurtenances. Tests shall demonstrate to Engineer that each part and all parts together function in accordance with the Contract Documents. Provide all necessary testing equipment, labor, and appurtenances.
   b. Verify that equipment operates at design point as intended, that vibration limits are not excessive and beyond manufacturer's recommendations, and that equipment operates smoothly without excessive noise, temperature rise, or other defects, across entire range of operating curve. Verify that all controls work as intended in both manual and automatic mode.
   c. If equipment does not comply with the Contract Documents and does not pass the tests, Contractor shall adjust, modify, and retest the equipment as often as necessary until tests are successfully passed.

3. Provide a qualified, factory-trained service person to perform the following:
   a. Instruct Contractor in installing equipment.
   b. After installation, inspect and adjust equipment, verify proper operation, and assist with field testing.
   c. Instruct operations and maintenance personnel in operation and maintenance of the equipment.

4. All costs, including expenses for travel, lodging, meals and incidentals, and cost of travel time, for visits to the Site shall be included in the Contract Price.

3.5 ADJUSTING

A. Adjust all controls for proper settings.

B. While system is operable, balance all equipment to achieve design conditions.

3.6 CLEANING

A. Thoroughly clean all equipment and accessories prior to installation.

B. Remove all dirt, rust, dust, etc. from equipment and accessories after installation.

C. Remove and dispose of all debris and waste from the Site resulting from installation.

3.7 COMMISSIONING OF PACKAGED OUTDOOR HEATING-ONLY MAKEUP-AIR UNITS

A. HVAC Contractor shall comply with the Commissioning Requirements of Contract Specification Section 23 08 00, Commissioning of HVAC.

END OF SECTION

SECTION 23 81 26

SPLIT HEAT PUMP AIR CONDITIONING SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install Split Heat Pump Air Conditioning System complete and operational with accessories. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. This Section includes Split Heat Pump Air Conditioning System consisting of the following:

1. Variable capacity, heat pump outdoor unit.

2. Indoor ceiling cassette units.

3. Indoor ducted fan coil units.

4. Fresh air ventilation system consisting of energy recovery ventilators with outside air bypass damper and energy recovery ventilation (sensible and latent).

5. Duct heaters.

6. VRF system master (centralized controller) controller with BACnet communications interface.

7. Thermostats.

8. Accessories.

C. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the Split Heat Pump Air Conditioning System Work.

2. Notify other Contractors in advance of the installation of the Split Heat Pump Air Conditioning System to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before, the Split Heat Pump Air Conditioning System Work.

D. Related Sections:

1. Section 23 05 53, Identification for HVAC Piping and Equipment.

2. Section 23 05 29, Hangers and Supports for HVAC Ductwork, Piping, and Equipment.

3. Section 23 09 23 18, Leak Detection Instruments

4. Section 23 23 00, Refrigerant Piping

5. Section 26 28 16.33, Disconnect Switches.

6. Section 23 09 23, Direct-Digital Control System for HVAC

7. Section 23 08 00, Commissioning of HVAC

1.2 REFERENCES

A. Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

1. AHRI 210/240 – Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

ASHRAE Standard 15 – Safety Standard for Refrigeration Systems.

C. American Society for Testing and Materials (ASTM).

1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.

3. ASTM B280 – Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

D. National Electrical Code (NEC).

E. National Electrical Manufacturers Association (NEMA).

F. Underwriters Laboratories Inc. (UL).

1. UL 1995 – Heating and Cooling Equipment.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
   a. Engage an experienced installer to perform the work of this Section who specializes in installing Split Heat Pump Air Conditioning System Work similar to that required for this Project and who is acceptable to manufacturer.

B. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single Split Heat Pump Air Conditioning System manufacturer.

2. Require the Split Heat Pump Air Conditioning System manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall equipment assembly by the Split Heat Pump Air Conditioning System manufacturer.

C. Regulatory Requirements:

1. National Electrical Code (NEC).

2. National Fire Protection Association (NFPA).

3. Underwriters Laboratories Inc. (UL).

4. Local and State Building Codes and Ordinances.

5. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

D. Certifications:

1. Split Heat Pump Air Conditioning System shall bear an approved label with all the necessary identification marks, electrical data, and any necessary cautions as required by the National Electric Code.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Drawings showing fabrication methods, assembly, accessories, installation details, and wiring diagrams.
   b. Detailed drawings of each individual component's wiring diagrams.

c. Detailed drawings of control panel layout.
d. Detailed installation drawing of each individual component showing:
   1) Mounting requirements.
   2) Locations (panel, field, etc.).
   3) Piping, and wiring connections, labeled and coded.
e. Setting drawings, templates, and directions for the installation of anchor bolts and other anchorages.

2. Product Data:
   a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all equipment.
   b. Complete component list.
   c. Detailed description of each component.
   d. Catalog cut sheets for each component.
   e. Deviations from Contract Documents. Any exceptions to the Contract Documents must be clearly defined. Contractor shall be responsible for any additional expenses that may occur due to any exception made.
   f. Other technical data related to specified material and equipment as requested by Engineer.

B. Informational Submittals: Submit the following:

1. Certificates:
   a. Independent certification reports:
      1) UL Label or equal.
      2) AHRI Label.

2. Manufacturer Instructions:
   a. Instructions and recommendations for handling, storing, protecting the equipment.
   b. Installation Data.
   c. Instructions for handling, start-up, and troubleshooting.

3. Field Quality Control Submittals:
   a. Written report presenting results of required field testing.

4. Supplier Reports:
   a. Submit written report of results of each visit to Site by Supplier's service personnel, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.

5. Qualifications Statements:
   a. Installer, when requested by Engineer.

C. Closeout Submittals: Submit the following:

1. Operations and Maintenance Data:
   a. Submit complete Installation, Operation and Maintenance Manuals, including, test reports, maintenance data and schedules, description of operation, and spare parts information.

b. Furnish Operation and Maintenance Manuals in conformance with the requirements of Section 01 78 23, Operations and Maintenance Data.

2. Warranty Documentation:
   a. General warranty.
   b. Special warranties on materials and equipment.

D. Maintenance Material Submittals: Furnish the following:

1. Spare Parts:
   a. Spare parts list and recommended quantities.
   b. One set of filters for each unit.

2. Spare parts, extra stock materials, and tools shall be packed in sturdy containers with clear indelible identification markings and shall be stored in a dry, warm location until transferred to the Owner at the conclusion of the Project.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

2. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

3. Comply with manufacturer's recommendations for rigging of equipment.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 WARRANTY

A. General Warranty: The special warranties specified in this Article shall not deprive Owner of other rights or remedies Owner may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under the Contract Documents. The obligations of Contractor under the Contract Documents shall not be limited in any way by the provisions of the specified special warranties.

B. Special Warranties on Materials and Equipment:

1. Provide manufacturer's written warranty, running to the benefit of Owner, agreeing to correct, or at option of Owner, remove or replace materials or equipment specified in this Section found to be defective during a period of years as listed below after the date of Substantial Completion.

2. The system shall be covered by the manufacturer's limited warranty for a period of one (1) year parts and seven (7) year compressor to the original owner from date of installation.

3. Installing contractor shall meet manufacturer requirements to obtain manufacturer's limited parts and compressor warranty for a period of ten (10 years to the date of installation. The warranty shall not include labor.

4. The system manufacturer shall have a minimum of fifteen (15) years continuous experience providing VRF systems in the United States.

5. All manufacturer technical and service manuals must be readily available for download by any local contractor should emergency service be required. Registering and sign-in requirements which may delay emergency service reference are not allowed.

6. The system shall be installed by a contractor with extensive installation experience and service training from the VRF equipment manufacturer. The mandatory contractor service and install training shall be performed by the manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: The system design shown in the contract documents is based on equipment and system designed by Mitsubishi.

B. Alternate Equipment Manufacturers: Systems designed and manufactured by the following will be considered subject to compliance with requirements:

1. Daikin

2. Or approved equal.

C. Alternate Equipment from Basis of Design

1. The alternate equipment supplier shall draft all piping circuits, components, overall building control schematic, detailed control wiring diagrams, system details and schedules for their system. The drawings shall convey all requirements to successfully install the alternate equipment suppliers system.

2. The submitted documents shall be complete system designs and show no less information than the HVAC equipment/controls contract bid documents.

2.2 EQUIPMENT PERFORMANCE

A. Equipment Description:

1. Units shall be completely factory assembled and tested, and internally piped and wired. Units shall consist of indoor air conditioners (indoor units) with filters, evaporator coils, supply fans, motors, and remotely located outdoor air-cooled heat pumps outdoor unit and energy recovery ventilator.

2. Units shall include all unit mounted controls, wiring, and accessories.

3. Accessories: Provide accessories for outdoor, indoor and ventilation units indicated in this specification section and as indicated on the Equipment Schedule.

4. Indoor units and refrigerant pipes shall be purged with dry air before shipment from the factory.

5. Outdoor units shall be pre-charged with refrigerant.

B. Design Criteria:

1. Design conditions shall be as indicated on the Equipment Schedule.

2. Units shall conform and be certified to the latest editions of ASHRAE Standard 15 and UL 1995.

C. Performance Criteria:

1. Minimum performance data for each unit shall be as indicated on the Equipment Schedule. Provided equipment shall not exceed scheduled total power.

2. Units shall meet or exceed the Energy Efficiency Ratio (EER) shown on the Equipment Schedule when tested in accordance to the latest editions of AHRI Standard 210/240.

3. System shall be capable of operating up to a minimum refrigerant tubing length of 100 feet between indoor and outdoor units without the need for line size changes, traps or additional oil.

2.3 DETAILS OF EQUIPMENT

A. Heat/Cool Air-Cooled Outdoor Units

1. The outdoor unit modules shall be air-cooled, direct expansion (DX), multi-zone units used specifically with VRF components described in this section. The outdoor unit modules shall be equipped with a single compressor which is inverter-driven and multiple circuit boards—all of which must be manufactured by the branded VRF manufacturer. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.

2. Outdoor unit systems may be comprised of multiple with differing capacity if a brand other than basis of design is proposed. All units requiring a factory supplied twinning kits shall be piped together in the field, without the need for equalizing line(s). If an alternate manufacturer is selected, any additional material, cost, and labor to install additional lines shall be incurred by the contractor. Contractor responsible for ensuring alternative brand compatibility in terms of availability, physical dimensions, weight, electrical requirements, etc.

3. Outdoor unit shall have a sound rating no higher than 62 dB(A) individually or 62 dB(A) twinned. Units shall have a sound rating no higher than 51 dB(A) individually or 54 dB(A) twinned while in night mode operation. If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.

4. Refrigerant lines from the outdoor unit to the indoor units shall be insulated in accordance with the manufacturer's installation instructions and Section 23 07 19 - HVAC Piping Insulation.

5. The outdoor unit shall have an accumulator with refrigerant level sensors and controls.

6. The outdoor unit shall have a high-pressure safety switch, over-current protection, crankcase heater and DC bus protection.

7. VRF system shall meet performance requirements per schedule and be within piping limitations & acceptable ambient temperature ranges as described in respective manufacturers' published product catalogs. Non-published product capabilities or performance data are not acceptable.

8. The outdoor unit shall be capable of operating in heating mode down to -4°F ambient temperatures or cooling mode down to 23°F ambient temperatures, without additional low ambient controls. If an alternate manufacturer is selected, any additional material, cost, and labor to meet low ambient operating condition and performance shall be incurred by the contractor.

9. The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained. Oil return sequences must be enabled only during extended periods of reduced refrigerant flow to ensure no disruption to correct refrigerant flow to individual zones during peak loads. Systems which might engage oil return sequence based on hours of operation risk oil return during inopportune periods are not allowed. Systems which rely on sensors (which may fail) to engage oil return sequence are not allowed.

10. Unit must defrost all circuits in order to resume full heating more quickly during extreme low ambient temperatures (below 23F). Partial defrost, also known as hot gas defrost which allows reduced heating output during defrost, is permissible only when ambient temperature is above 23F.

11. The outdoor unit shall be capable of operating in cooling mode down to -10°F with optional manufacturer supplied low ambient kit.

12. The low ambient kit shall be provided in a control box rated for outdoor installation and capable of controlling kit operation automatically in all outdoor unit operation modes.

13. Unit Cabinet Construction
    a. The casing(s) shall be fabricated of galvanized steel, bonderized and finished.
    b. The outdoor unit shall be tested in compliance with ISO9277 such that no unusual rust shall develop after 960 hours of salt spray testing.
    c. Panels on the outdoor unit shall be scratch free at system startup. If a scratch occurs the salt spray protection is compromised, and the panel should be replaced immediately.

14. Fan
    a. Each outdoor unit module shall be furnished with direct drive, variable speed propeller type fan(s) only.
    b. All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.
    c. All fans shall be provided with a raised guard to prevent contact with moving parts.

15. Coil
    a. The outdoor heat exchanger shall be of zinc coated aluminum construction with turbulating flat tube construction. The coil fins shall have a factory applied corrosion resistant finish. Uncoated aluminum coils/fins are not allowed.
    b. The coil shall be protected with an integral metal guard.
    c. Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.

16. Compressor
    a. Each outdoor unit module shall be equipped with only inverter driven scroll hermetic compressors.

b. Crankcase heat shall be provided via induction-type heater utilizing eddy currents from motor windings. Energy-wasting “belly-band” type crankcase heaters are not allowed.
c. Compressor shall have an inverter to modulate capacity. The capacity for each compressor shall be variable with a minimum turndown not greater than 20%.
d. The compressor shall be equipped with an internal thermal overload.
e. Field-installed oil equalization lines between modules are not allowed. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.

17. Controls
    a. Outdoor unit shall include Variable Evaporator Temperature or comparable method of varying system evaporator (refrigerant) temperature in order to reduce compression ratio and power consumption during light load or mild ambient temperatures. Multiple evaporator refrigerant temperature settings shall be required in order to optimize efficiency within required system-specific performance and installation constraints. System shall reduce compression ratio only when/if all indoor units are within 1.8F of setpoint; reducing compression ratio based solely on ambient temperature risks discomfort and is not allowed. Variable Evaporator Temperature or comparable method shall incorporate override or disable capability based on external signal to allow for space humidity control or load demand. The unit shall be an integral part of the system & control network described in the Controls section and react to heating/cooling demand as communicated from connected indoor units over the control circuit. Required field-installed control voltage transformers and/or signal boosters shall be provided by the manufacturer.

B. Refrigerant

1. R-454B or R-32 refrigerant shall be required for VRF systems.

2. Provide refrigerant release mitigation controls, including leak detection for R-454B/R-32 refrigerant, stop valves, control devices in compliance with ANSI/ASHRAE standard 15-2022. Refer to specification section 23 09 23.18 for requirements.

C. Ceiling-Recessed Cassette Air Conditioners:

1. The ceiling-recessed indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function, a test run switch, and the ability to adjust airflow patterns for different ceiling heights. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

2. Cabinet:
    a. Cabinet shall be formed from galvanized sheet metal coated with high-density foam insulation.
    b. Cabinet shall be for recessed mounting and provided with four corner mounting supports behind removable corner pockets in grille assembly allowing adjustment of mounting height from front of unit.
    c. White grille assembly shall be attached to the front of the cabinet to provide supply air vanes in four directions and a center mounted return air section. Four-way grille shall allow two, three, or four-way blow.
    d. Cabinet panel shall have provisions for a field installed filtered outside air intake.
    e. Cabinet shall have a knock-out to provide a branch air duct for conditioning a secondary space.

3. Evaporator Coil:
    a. Coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing. All tube joints shall be brazed with PhosCopper or silver alloy.
    b. Coil shall be pressure tested at the factory.
    c. Coil shall be furnished with a condensate pan and drain.
    d. Unit shall include a built-in, automatic condensate lift mechanism that will be able to raise condensate 33 inches above the condensate pan. The lift mechanism shall be equipped with a positive acting liquid level sensor to shut down the indoor unit if liquid level in the drain pan reached maximum level.
    e. If gravity drain is not feasible; an external or field-installed pump shall be used.

4. Supply Fans:
    a. Direct drive, turbo propeller fan shall be driven by a single motor.
    b. Multi-speed fan motor shall have permanently lubricated bearings.
    c. Fan shall have a selectable AUTO fan setting that will adjust the fan speed based on the difference between controller setpoint and sensed space temperature.

5. Vanes:
    a. Motorized adjustable air outlet system shall provide two-way, three-way, or four-way airflow with switches that can be set to provide optimum airflow based on ceiling height and number of outlets used.
    b. Vane angles shall be individually adjustable from the remote controller to customize the airflow pattern for the conditioned space.
    c. Vanes shall have five fixed positions and a swing feature that shall be capable of automatically swinging the vanes up and down for uniform air distribution.
    d. Vanes shall have the selectable capability to randomly cycle the vanes up and down to evenly heat the space in the heating mode.

6. Filter:
    a. Return air shall be filtered by means of an easily removable, washable polypropylene honeycomb filter.
    b. High efficiency MERV 10 filter shall be installed in the multi-function casement.

7. Accessories:
    a. Return air shall be filtered by means of an easily removable, washable polypropylene honeycomb filter.
    b. High efficiency MERV 10 filter shall be installed in the multi-function casement.

D. Horizontal-Ducted Indoor Unit

1. The Horizontal-Ducted Indoor Unit shall be factory assembled, wired and tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function, a test run switch Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

2. Cabinet:
    a. Galvanized steel or corrosion-resistant material suitable for concealed installations.
    b. Factory-applied insulation to minimize sound and condensation.
    c. Removable access panels to access fan motor, coil, and control box for maintenance.
    d. Access panels securely fastened; gasketed to reduce noise and air leakage.

3. Evaporator Coil:
    a. Coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing. All tube joints shall be brazed with PhosCopper or silver alloy.
    b. Coil shall be pressure tested at the factory.
    c. Coil shall be furnished with a condensate pan and drain.
    d. Unit shall include a built-in, automatic condensate lift mechanism that will be able to raise condensate 33 inches above the condensate pan. The lift mechanism shall be equipped with a positive acting liquid level sensor to shut down the indoor unit if liquid level in the drain pan reached maximum level.
    e. If gravity drain is not feasible; an external or field-installed pump shall be used.

4. Supply Fans:
    a. Direct drive, turbo propeller fan shall be driven by a single motor.
    b. Multi-speed fan motor shall have permanently lubricated bearings.
    c. Fan shall have a selectable AUTO fan setting that will adjust the fan speed based on the difference between controller setpoint and sensed space temperature.
    d. Electronically commutated (EC) motor or equivalent high-efficiency motor

5. Filter:
    a. High efficiency MERV 10 filter shall be installed in the multi-function casement.

E. Wall-Mounted Ductless Indoor Unit

1. The Wall-Mounted Ductless Indoor Unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function, a test run switch, and the ability to adjust airflow patterns for different ceiling heights. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

2. Cabinet:
   a. Attractive, durable, impact-resistant front panel.
   b. Easy-to-remove front grille for filter cleaning and maintenance.
   c. Cabinet shall be for wall mounting provided with mounting supports.

3. Evaporator Coil:
   a. Copper tubes with aluminum fins for efficient heat transfer.
   b. Unit shall include a built-in, automatic condensate lift mechanism that will be able to raise condensate 33 inches above the condensate pan. The lift mechanism shall be equipped with a positive acting liquid level sensor to shut down the indoor unit if liquid level in the drain pan reached maximum level.
   c. If gravity drain is not feasible; an external or field-installed pump shall be used.

4. Supply Fans:
   a. Direct-drive, cross-flow (or tangential) fan designed for quiet operation.
   b. Multi-speed fan motor shall have permanently lubricated bearings.
   c. Fan shall have a selectable AUTO fan setting that will adjust the fan speed based on the difference between controller setpoint and sensed space temperature.
   d. High-efficiency DC fan motor.

5. Vanes:
   a. Motorized adjustable air outlet system shall provide two-way, three-way, or four-way airflow with switches that can be set to provide optimum airflow based on ceiling height and number of outlets used.
   b. Vane angles shall be individually adjustable from the remote controller to customize the airflow pattern for the conditioned space.
   c. Vanes shall have five fixed positions and a swing feature that shall be capable of automatically swinging the vanes up and down for uniform air distribution.
   d. Vanes shall have the selectable capability to randomly cycle the vanes up and down to evenly heat the space in the heating mode.

6. Filter:
   a. Return air shall be filtered by means of an easily removable, washable polypropylene honeycomb filter.
   b. High efficiency MERV 10 filter shall be installed in the multi-function casement.

7. Accessories:
    a. Return air shall be filtered by means of an easily removable, washable polypropylene honeycomb filter.
    b. High efficiency MERV 10 filter shall be installed in the multi-function casement.

F. Ventilation - Energy Recovery Ventilator (ERV)

1. Outdoor air for ventilation purposes shall be provided from energy recovery units (ERV) or directly from the outside. Refer to plans for OA supply configuration. This section does not apply to units that receive OA directly from outdoors.

2. The ERV unit shall be factory assembled, wired, and run tested. Contained within the unit shall be all factory wiring, control circuit board and blowers with motors, filters, and insulated foam air guides. The unit shall have factory installed inlet air thermistors, control board with functions for local, remote, and optional control modes.

3. The unit cabinet shall be fabricated of galvanized steel, and covered with polyurethane foam insulation as necessary with steel mounting points securely attached.

4. Blowers
    a. The unit shall be furnished with direct drive centrifugal blowers running to supply and extract air at the rates indicated on the drawings.
    b. The blower motors shall be a directly connected to the blower wheels and have permanently lubricated bearings.

5. Heat Exchanger
    a. Core type: Fixed Permeable Cross Plate
    b. The enthalpic heat exchanger element shall be constructed of specially treated cellulous fiber membrane separated by corrugated layers to allow total heat (sensible and latent) energy recovery from the exhaust air to the supply air or from the supply air to the exhaust air as determined by design conditions.
    c. Basis of design heat exchanger does not require condensate drain. Contractor responsible for all additional costs relating to alternate brands which may require condensate drain connection.

6. Bypass Damper
    a. The ERV shall have an automatic supply side by-pass damper to allow inbound ventilation air to by-pass the heat exchanger element when factory-installed thermistors measure outside ambient temperature being at least 7 degrees cooler than air returned from interlocked indoor units running in cooling mode.
    b. The mechanism for opening and closing the bypass damper shall be a 208V-230V synchronous electric motor through an actuator. The motor will drive a steel cable connected to a mechanical damper flap to allow fresh air to bypass the element.

7. Filter
    a. The ERV shall be equipped with factory installed, washable air filters located at each intake face (both supply and exhaust sides) of the heat exchanger element to clean the air and prevent clogging.

8. Controls
    a. ERV shall be capable of interlocked control with other systems by manufacturer. Communication must include MODE of interlocked indoor unit to allow benefit of proper operation of bypass damper.
    b. ERV control board shall allow independent control by contact closure from third-party sensor-driven controllers, switches, or timers.
    c. Controls shall vary ERV fan speeds in response to Demand Ventilation Controls

9. Performance
    a. The ERV shall have nominal capacities as indicated on the drawings.
    b. ERV performance must be certified to ARI Standard 1060.
    c. ERV operating sound level shall not exceed 40.5 dB(A) as measured 59 inches under center of unit at maximum fan speed.

10. Ductwork
    a. The two outdoor ducts shall be covered with insulation to prevent condensation from forming. See Section 23 07 13 - Duct Insulation.
    b. The outdoor ducts shall be pitched at a gradient (1/30 or more) down toward the outdoor area from the ERV unit.

11. Manufacturers
    a. Lossnay.
    b. Or approved equal.

G. Electric Duct Heater

1. Electric resistance heaters designed for integration with Energy Recovery Ventilators (ERVs).

2. Construction Features:
    a. Open-coil element with high-grade, nickel-chrome wire.
    b. Corrosion-resistant galvanized steel housing.
    c. Round duct collars for easy integration.
    d. High-voltage terminal block connections.
    e. Grounding lug and mounting flanges.
    f. Vertical or horizontal operation.
    g. Standard control transformer (24 VAC).

3. Control and Modulation: Modulating heat output via Solid State Relay (SSR) control.

4. Safety Features
    a. Low Airflow Modulation/Shut Off: A thermistor airflow sensor shall detect overheating due to low airflow.

b. Auto-Reset Thermal Cutout: Activates at 125°F, shutting off power to the heater element and automatically resetting once temperatures drop below this threshold.
c. Manual Reset Thermal Cutout: Activates at 200°F, requiring manual reset after the unit cools down.
d. Airflow Sensor: Ensures minimum allowable airflow is maintained, reducing current to the heating coils if airflow is inadequate.

5. Manufacturers
   a. RenewAire, RH Series.
   b. Or approved equal.

2.4 ACCESSORIES

A. Hangers and Supports:

1. Hangers and supports shall be provided in accordance with Section 23 05 29, Hangers and Supports for HVAC Ductwork, Piping, and Equipment.

B. Outdoor and indoor units shall be provided by Electrical contractor conforming to Section 26 28 16.33, Disconnect Switches.

C. Refrigerant Piping and Insulation:

1. All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, Type ACR, meeting ASTM B280 requirements.

2. Refrigerant piping shall be individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero), elastomeric material.

3. Insulation shall have a maximum thermal conductivity of 0.27 Btu-in/hr-ft^2-degree F at 75 degrees F and a maximum water vapor transmission of 0.08 perm-in.

4. Insulation shall have a maximum Flame Spread Index of 25 and a maximum Smoke Developed Index of 50 when tested in accordance with ASTM E84.

D. Indoor units shall be provided with a condensate mini-pump that is capable of lifting condensate 23 inches above the drain pan.

2.5 CONTROLS

A. Units shall be completely factory wired with the necessary controls, starters, contactors and terminal blocks for power and control wiring.

B. A color-coded circuit diagram of the approved electrical drawing shall be provided with the unit.

C. All electrical components shall bear the UL label.

D. Units shall be designed for single point electrical connection. All necessary power transformers shall be factory provided and installed.

E. The system shall be capable of satisfactory operation within voltage limits of 198 VAC to 253 VAC, 1 Phase, 60 Hz.

F. The control system shall consist of a minimum of two microprocessors, one on each indoor and outdoor unit, interconnected by a single non-polar two-wire cable. The outdoor unit shall be controlled by the microprocessor located in the indoor unit using 24 VDC pulse control signal.

G. The indoor unit control board shall have auxiliary control contact connectors to provide:

1. Remote Switch.

2. Central Control.

3. IP Terminal.

H. The microprocessor located in the indoor unit shall have the capability of monitoring return air temperature and indoor coil temperature, receiving and processing commands from a wireless or wired controller, providing emergency operation and controlling the outdoor unit.

I. The system shall include a 3-minute time delay mechanism, an automatic restart function when power is restored after power interruption, and a test run switch.

J. The system shall have self-diagnostics ability, including total hours of compressor run time. Diagnostics codes for indoor and outdoor units shall be displayed on the controller panel.

K. Controllers:

1. Remote Controller - Hard Wired:
    a. Controller shall perform input functions necessary to operate the system.
    b. Controller shall have a Power ON/OFF switch, Mode Selector (Cool, Dry, Heat, Auto, and Powerful Modes), Temperature Setting, Timer Control, Fan Speed Select, and Horizontal and Vertical Vane control selector.
    c. The indoor unit shall perform Self-diagnostic Function and Check Mode switching.
    d. Temperature changes shall be in 1 degree F (0.5 degree C) increments with a setting range of 61-88 degrees F (16-31 degrees C).

2. Centralized Controller:
    a. The Centralized Controller shall be powered with an integrated 100-240 VAC power supply. The Centralized Controller shall support system configuration, daily/weekly scheduling, monitoring of operation status, night setback settings, free contact interlock configuration and malfunction monitoring. When being used alone without the expansion controllers, the Centralized Controller shall have five basic operation controls which can be applied to an individual indoor unit, a collection of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic set of operation controls for the Centralized Controller shall include on/off, operation mode selection (cool, heat, auto dry, setback and fan), temperature setting, fan speed setting, and airflow direction setting. Since the centralized controller shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the Centralized Controller shall allow the user to define both daily and weekly schedules (up to 24 scheduled events per day) with operations consisting of ON/OFF, mode selection, temperature setting, air flow (vane) direction, fan speed, and permit/prohibit of remote controllers.
    b. All centralized controllers shall be equipped with two RJ-45 Ethernet ports to support interconnection with a network PC via a closed/direct Local Area Network (LAN) or to a network switch for IP communication to up to three expansion controllers for display of up to two hundred (200) indoor units on the main centralized controller interface.
    c. The centralized controller shall be capable of performing initial settings via the high-resolution, backlit, color touch panel on the controller or via a PC browser using the initial settings.
    d. Standard software functions shall be available so that the building manager can securely log into each centralized controller via the PC's web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics.

3. The VRF system controls network shall be capable of supporting integration with the Building Management System (BMS).

2.6 IDENTIFICATION

A. All equipment and component identification shall be provided in accordance with Section 23 05 53 - Identification for HVAC Piping and Equipment.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. Take field measurements where required prior to installation to ensure proper fitting of Work.

C. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the work.

D. Examine products before installation. Reject products that are wet, moisture damaged, or mold damaged.

E. Examine roughing-in for piping and tubing to verify actual locations of connections before equipment installation.

F. Examine roughing-in for wiring and conduit to verify actual locations of connections before equipment installation.

G. Examine walls, floors, roofs, and outdoor pads for suitable conditions where equipment will be installed.

3.2 PREPARATION

A. Protection of Surrounding Areas/Surfaces:

1. Openings and penetrations shall be capped to protect the building from outside conditions.

2. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

B. Protection of Products:

1. Protect products from moisture and water damage. Remove and replace products that are wet, moisture damaged, or mold damaged.

2. Protect equipment from physical damage. Replace equipment with physical damage that cannot be repaired to new condition. Observable surface imperfections shall be grounds for removal and replacement.

3. Protect equipment from electrical damage. Replace equipment suffering electrical damage.

4. Cover and seal openings of equipment to keep inside of equipment clean. Do not remove covers until finish work is complete.

3.3 INSTALLATION

A. General:

1. Install the equipment in accordance with the Contract Documents and by manufacturer's instructions and recommendations. Obtain written interpretation from Engineer in the event of conflict between manufacturer's instructions and recommendations and the Contract Documents.

2. Install in accordance with Laws and Regulations.

3. Do not modify structures to facilitate installation of equipment, unless approved in writing by Engineer.

4. Installation to conform to requirements of all local and state codes.

5. Clearance:
   a. Maintain manufacturer's recommended clearances for service and maintenance.
   b. Maintain clearances required by governing code.

6. Loose Components: Install components, devices, and accessories furnished by manufacturer, with equipment, that are not factory mounted. Loose components shall be installed by system installer under supervision of manufacturer's service representative.

B. Installation of Indoor Units:

1. Install units to be level and plumb while providing a neat and finished appearance.

2. Unless otherwise required by the VRF equipment manufacturer, support ceiling mounted units from structure above using threaded rods; minimum rod size of 3/8 inch.

3. Adjust supports of exposed and recessed units to draw units tight to adjoining surfaces.

4. Protect finished surfaces of ceilings, floors, and walls that come in direct contact with units. Refinish or replace damaged areas after units are installed.

5. In rooms without a ceiling, arrange piping and tubing, controls, and electrical power serving units to provide a neat and finished appearance.

6. Provide lateral bracing if needed to limit movement of suspended units to not more than 0.25 inches.

7. Attachment: Install hardware for proper attachment to supported equipment.

C. Installation of Outdoor Units:

1. Install units to be level and plumb while providing a neat and finished appearance.

2. Install outdoor units on support structures indicated on the drawings.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage VRF HVAC system manufacturer's service representative to advise and assist installers; witness testing; observe and inspect components, assemblies, and equipment installations, including controls and connections.

1. Field service shall be performed by a factory-trained and -authorized service representative of VRF HVAC system manufacturer whose primary job responsibilities are to provide direct support of its products.

2. Additional factory-authorized representatives may assist with completion of certain activities only if supervised by manufacturer's employee. A factory-authorized representative shall not provide assistance without manufacturer's employee supervision.

B. Final Inspection before startup:

1. Before inspection, installer to provide written request to manufacturer stating the system is fully installed according to manufacturer's requirements and ready for final inspection.

2. All system equipment and operating components shall be inspected. If components are inaccessible for inspection, they shall be made accessible before the final inspection can be completed.

3. Manufacturer shall provide a comprehensive inspection of all equipment and each operating component that comprise the complete system(s). Inspection shall follow a detailed checklist specific to each equipment and operating component.

4. Inspection reports for indoor units shall include, but not limited to the following:
   a. Unit designation on drawings
   b. Manufacturer model number
   c. Serial number
   d. Network address, if applicable
   e. Each equipment setting
   f. Mounting, supports, and restraints properly installed.
   g. Proper service clearance required
   h. Wiring and power connections are correct.
   i. Line-voltage reading(s) within acceptable range.
   j. Wiring and controls connection are correct.
   k. Low-voltage reading(s) within acceptable range.

l. Controller type and model controlling unit.
m. Controller location.
n. Temperature settings and readings within an acceptable range.
o. Humidity settings and readings within an acceptable range.
p. Condensate removal acceptable.
q. Fan settings and readings within an acceptable range.
r. Unit airflow direction within an acceptable range.
s. Fan external static pressure setting (for ducted concealed units).
t. Filter type and condition acceptable.
u. Noise level within an acceptable range.
v. Refrigerant piping properly connected and insulated.
w. Ductwork properly connected.
x. External interlocks properly connected.
y. Remarks.

5. Inspection reports for outdoor units shall include, but not limited to the following:
   a. Unit designation on the drawings.
   b. Manufacturer model number.
   c. Serial number.
   d. Network address, if applicable.
   e. Each equipment setting.
   f. Mounting, supports, and restraints properly installed.
   g. Proper service clearance provided.
   h. Wiring and power connections are correct.
   i. Line-voltage reading(s) within acceptable range.
   j. Wiring and controls connections are correct.
   k. Low-voltage reading(s) within an acceptable range.
   l. Condensate removal is acceptable.
   m. Noise level within an acceptable range.
   n. Refrigerant piping properly connected and insulated.
   o. Condensate drain piping properly connected and insulated.
   p. Remarks

C. Perform the following tests and inspections with the assistance of manufacturer's service representative:

1. Perform each visual and mechanical inspection and electrical test stated in ANSI/NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. System Refrigerant Charge

1. Using information collected from the refrigerant tubing evacuation testing, system installer shall consult VRF manufacturer to determine the correct system refrigerant charge.

2. Installer shall charge system following VRF HVAC system manufacturer's written instructions.

3. System refrigerant charging shall be witnessed by system manufacturer's representative.

4. Total refrigerant charge shall be recorded and permanently displayed at the system's outdoor unit(s).

E. Products will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

3.5 START-UP SERVICE

A. Engage a VRF HVAC system manufacturer's service representative to perform system(s) startup service.

1. Service representative shall be factory-trained and authorized service representative of VRF HVAC system manufacturer.

2. Complete startup service of each separate system.

3. Complete system startup service according to manufacturer's written instructions.

B. Startup checks shall include, but not limited to the following:

1. Check control communications of equipment and each operating component in system(s).

2. Check each indoor unit's response to demand for cooling and heating.

3. Check each indoor unit's response to changes in airflow settings.

4. Check each indoor unit and outdoor unit for proper condensate removal.

5. Check sound levels of each indoor and outdoor unit.

C. Installer shall accompany manufacturer's service representative during startup service and provide manufacturer's service representative with requested documentation and technical support during startup service.

1. Installer shall correct deficiencies found during startup service for reverification.

D. System Operation Report:

1. After completion of startup service, manufacturer shall issue a report for each separate system.

2. Report shall include complete documentation describing each startup check, the result, and any corrective action required.

3. Manufacturer shall electronically record not less than 2 hours of continuous operation of each system and submit with report for historical reference.

4. All available system operating parameters shall be included in the information submitted.

E. Witness

1. Provide written notice not less than 20 business days before start of startup service.

3.6 ADJUSTING

A. Adjust all controls for proper settings.

B. While system is operable, balance all equipment to achieve design conditions.

3.7 CLEANING

A. Thoroughly clean all equipment and accessories prior to installation.

B. Remove all dirt, rust, dust, etc. from equipment and accessories after installation.

C. Remove and dispose of all debris and waste from the Site resulting from installation.

3.8 COMMISSIONING OF SPLIT HEAT PUMP AIR CONDITIONING SYSTEM

A. HVAC Contractor shall comply with the Commissioning Requirements of Contract Specification Section 23 08 00, Commissioning of HVAC.

END OF SECTION

SECTION 23 82 00

CONVECTION HEATING AND COOLING UNITS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install cabinet unit heaters complete and operational with accessories. Product specific requirements are contained herein; Section 23 01 00, Basic Mechanical Requirements, shall be referred to for general requirements.

B. This section contains:

1. Electric Cabinet Unit Heaters

2. Electric Baseboard Heaters

3. Electric Unit Heaters

C. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the cabinet unit heaters Work.

2. Notify other Contractors in advance of the installation of cabinet unit heaters to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed with, or before, the cabinet unit heaters Work.

D. Related Sections:

1. Section 23 05 53, Identification for HVAC Piping and Equipment.

2. Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

3. Section 23 09 23, Direct-Digital Control System for HVAC.

1.2 REFERENCES

A. National Electrical Code (NEC).

B. National Electrical Manufacturers Association (NEMA).

C. Underwriters Laboratories Inc. (UL).

1. UL 873 – Temperature-Indicating and -Regulating Equipment.

1.3 QUALITY ASSURANCE

A. Qualifications:

B. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single cabinet unit heater manufacturer.

2. Require the cabinet unit heater manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.

3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall equipment assembly by the cabinet unit heater manufacturer.

C. Regulatory Requirements:

1. National Electrical Code (NEC).

2. National Fire Protection Association (NFPA).

3. Underwriters Laboratories Inc. (UL).

4. Local and State Building Codes and Ordinances.

5. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

D. Certifications:

1. Cabinet unit heaters shall bear an approved label with all the necessary identification marks, electrical data, and any necessary cautions as required by the National Electric Code.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Drawings showing fabrication methods, assembly, accessories, installation details, and wiring diagrams.

2. Product Data:
    a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all equipment.
    b. Complete component list.
    c. Detailed description of each component.
    d. Catalog cut sheets for each component.
    e. Deviations from Contract Documents. Any exceptions to the Contract Documents must be clearly defined. Contractor shall be responsible for any additional expenses that may occur due to any exception made.
    f. Other technical data related to specified material and equipment as requested by Engineer.

3. Color Sample: Color of heater shall be selected from manufacturer's standard colors.

B. Informational Submittals: Submit the following:

1. Certificates:
    a. Independent certification reports:
        1) UL Label or equal.

2. Manufacturer Instructions:
    a. Instructions and recommendations for handling, storing, protecting the equipment.
    b. Installation Data.
    c. Instructions for handling, start-up, and troubleshooting.

C. Closeout Submittals: Submit the following:

1. Operations and Maintenance Data:
    a. Submit complete Installation, Operation and Maintenance Manuals, including, test reports, maintenance data and schedules, description of operation, and spare parts information.

2. Certificate: Contractor's start-up and demonstration affidavit/

D. Maintenance Material Submittals: Furnish the following:

1. Spare Parts:
    a. Spare parts list and recommended quantities.

2. Tools:
    a. Two sets of special tools, if any, required for normal operation and maintenance.

3. Spare parts and tools shall be packed in sturdy containers with clear indelible identification markings and shall be stored in a dry, warm location until transferred to the Owner at the conclusion of the Project.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.

2. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of that Work.

3. Comply with manufacturer's recommendations for rigging of equipment.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 EQUIPMENT PERFORMANCE

A. Design Criteria:

1. Design conditions shall be as indicated on the Equipment Schedule.

B. Performance Criteria:

1. Minimum performance data for each unit shall be as indicated on the Equipment Schedule. Provided equipment shall not exceed scheduled total power.

2.2 DETAILS OF EQUIPMENT

A. Electric Cabinet Unit Heater

1. Manufacturer: Provide one of the following:
   a. Berko, FRC Series
   b. Or equal.

2. Cabinet Section:
   a. Back Box: The back box shall be designed as a recessed rough-in box in either masonry or frame installations and is also used when surface mounting frames are used in surface mounting installations. The back box shall be heavy gauge galvanized steel and shall contain knockouts through which power leads enter.
   b. Surface Mounting Frame: The surface mounting frame shall be of heavy gauge steel designed to mount around the back box for a finished surface installation. Slot knock outs shall be provided for power supply conduit.
   c. Front Cover: The louvered front cover shall be of heavy gauge steel with a powder paint finish. A plug button will be provided to replace the thermostat knob and render the unit tamper-resistant.
   d. Finish: All sheet metal parts, except the galvanized steel back box, shall be phosphatized, then completely painted by a powder paint process.

3. Heating Elements:
   a. The heating element shall be of the non- glowing design consisting of an 80/20 nickel-chromium resistance wire enclosed in a steel sheath to which plate fins are copper brazed. The element shall cover the entire air discharge area to ensure uniform heating of all discharged air. It shall be warrantied for 5 years.
   b. Heaters shall be cETLus listed.

4. Fan and Motor:
   a. The fan motor shall be a shaded 2 pole, impedance protected, class B”insulation with permanently lubricated.
   b. Thermal cutout shall be to self-hold (manual-reset), snap-action type designed to shut off heat in the event of overheating. The fan shall be tangential blower for whisper quiet operation.

5. Controls:
   a. Fan delay switch to activate fan after heating element reaches operating temperature and continue to operate until the element is cool.
   b. Linear high temperature thermal cutout with automatic reset.
   c. Built-in voltage relay kit for remote 24 VAC thermostat

B. Electric Unit Heater

1. Manufacturer: Provide one of the following:
   a. Berko, HUHAA Series
   b. Or equal.

2. Construction:
    a. Cabinet: 18-gauge die-formed steel with bronze polyester powder coat finish.
    b. Louvers: Individually adjustable with 30-degree downward stops.
    c. Mounting: Suitable for wall or ceiling installation; mounting brackets provided.

3. Fans and Motors:
    a. Design: Pull-through airflow
    b. Fan: Aluminum, directly connected to motor.
    c. Motor: Totally enclosed, thermally protected, continuous duty.

4. Heating Elements:
    a. Type: Copper-clad steel sheath with aluminum fins.
    b. 80/20 Nichrome wire encased in magnesium oxide (MGO) for strength and corrosion resistance

5. Fan and Motor:
    a. Fan: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
    b. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.

6. Controls and Safety:
    a. Control Voltage: 24V transformer standard for remote 24 VAC thermostat control.
    b. Thermostats:
        1) Refer to Section 23 09 23, Direct-Digital Control System for HVAC.
    c. Fan Delay: Automatic control delays fan until heating element is warm; continues operation until element cools.
    d. Thermal Cutout: Automatic reset linear capillary type.
    e. Manual reset thermal cutout.

C. Electric Baseboard Heater

1. Manufacturer: Provide one of the following:
    a. Berko, BKOC series
    b. Or equal.

2. Construction:
    a. Cabinet: 20-gauge cold-rolled steel front cover with textured polyester powder coat finish.
    b. Brackets: 20-gauge steel

3. Heating Elements:
    a. Type: Steel-sheathed heating element with aluminum fins
    b. Composition: 80% nickel, 20% chromium wire encased in steel sheath.
    c. Design: Chimney-fin element for maximum air circulation

4. Controls and Safety:
    a. Control Voltage: 24V transformer/relay for remote 24 VAC thermostat control.

b. Thermostats:
   1) Refer to Section 23 09 23, Direct-Digital Control System for HVAC.
c. High-temperature safety limit.
d. Linear thermal cutout for automatic shut-off in case of overheating.
e. UL-listed for installation flush to any wall and flat on any floor type.
f. Units shall be provided with integral disconnect switch.

2.3 CONTROLS

A. Refer to control drawings and Section 23 09 23, Direct-Digital Control System for HVAC for controls schematics and sequence of operations.

2.4 IDENTIFICATION

A. All equipment and component identification shall be provided in accordance with Section 23 05 53, Identification for HVAC Piping and Equipment.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

B. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.2 INSTALLATION

A. General:

1. Install the equipment in accordance with the Contract Documents and by manufacturer's instructions and recommendations. Obtain written interpretation from Engineer in the event of conflict between manufacturer's instructions and recommendations and the Contract Documents.

2. Install in accordance with Laws and Regulations.

3. Do not modify structures to facilitate installation of equipment, unless approved in writing by Engineer.

4. Installation to conform to requirements of all local and state codes.

B. The Division 23 Temperature Control Contractor shall furnish and install field control devices (BACnet thermostats)

C. The Division 23 Temperature Control Contractor shall verify that the control wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-23 Sections. Do not proceed with equipment start-up until control wiring installation is acceptable.

3.3 FIELD QUALITY CONTROL

A. Field Tests:

1. After equipment installation is complete, Contractor and a qualified field service representative of unit manufacturer shall perform an operating test of each unit and associated controls, in presence of Engineer. Equipment will pass the test when each unit and its controls are demonstrated to function correctly.

3.4 ADJUSTING

A. Adjust all controls for proper settings.

B. Position unit and adjust grilles.

3.5 CLEANING

A. Thoroughly clean all equipment and accessories prior to installation.

B. Remove all dirt, rust, dust, etc. from equipment and accessories after installation.

C. Remove and dispose of all debris and waste from the Site resulting from installation.

END OF SECTION

DIVISION 26 - ELECTRICAL

SECTION 26 01 00

GENERAL REQUIREMENTS FOR ELECTRICAL CONTRACT

PART 1 GENERAL

1.1 SCOPE OF WORK

A. All drawings and general provisions of the Contract, including all General and Supplementary Conditions, Division 01 Specification Sections, and Instructions to Bidders apply to this section and all other sections of Division 26.

B. The electrical work includes but is not limited to the following work:

1. Removal and installation of light fixtures and the associated lighting controls.

1.2 LICENSING

A. Where required the contractor shall hold a license, issued or recognized by the authority having Jurisdiction, to perform electrical work.

1.3 INSPECTIONS

A. Provide rough in and final inspection by an electrical inspector certified by the AIAEI (the American International Association of Electrical Inspectors)

1.4 CODES AND STANDARDS

A. New York State Uniform Fire Prevention and Building Code: Provide all work in compliance with and meet the requirements of the latest issue.

B. National Electrical Code: All work covered under these Contract Documents shall conform to the latest issue of the National Electrical Code.

C. Standards: All equipment shall meet all the requirements of ANSI, NEMA, IES, and IEEE standards.

D. Listing: All equipment and devices for which Underwriters' Laboratory has a listing service, shall be UL listed and bear the UL listing label.

E. All materials and installation shall comply with the requirements of:

1. Building Code of New York State

2. Energy Conservation Construction Code of New York State.

3. Fire Code of New York State

4. National Fire Protection Association (NFPA).

5. New York State Department of Labor Rules and Regulations.

6. New York Board of Fire Underwriters.

7. The Americans with Disabilities Act.

8. Local Utilities.

9. Local Municipality/City Codes and Ordinances and the Authority Having Jurisdiction

10. Local Fire Department.

11. New York State Education Department

1.5 INTENT OF DRAWINGS

A. The drawings are diagrammatic, unless detailed dimensioned drawings are included. Drawings show approximate locations of equipment, fixtures, panelboards, conduits, and wiring devices. Exact locations are subject to the approval of the Owner's Representative. The general run of electrical feeders, branch circuits, and conduits, indicated on the drawings, is not intended to be the exact routing. Circuit designations, in the form of "Home Runs" on branches, indicate the designation of the branch circuit, and the panelboard or interconnection box from which the branch circuit is served.

B. Drawings show general design and arrangement. Verify exact location and elevations at the job location. Do not scale plans and diagrams.

C. Drawings do not show all offsets, fittings, interferences, and elevation changes. Adjust installation of conduit, equipment location, etc. to accommodate work with the obstacles and interferences. Where a major and important rearrangement is necessary, report same to Architect for review. Obtain written approval for all major changes.

D. Cooperate with all Contracts and Owners and determine the exact route of all raceway and location of all equipment.

1.6 BASIS OF DESIGN

A. The contract documents are prepared on basis of one manufacturer as "design equipment," even though other manufacturers' names are listed as acceptable makes. If Contractor elects to use one of the listed makes other than "design equipment," submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger electrical feeders, circuit breakers, equipment, additional control devices and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace door frames, access doors, walls ceilings or floors required to install other than design make equipment. If revised arrangement submittal is rejected, revise and resubmit specified "design equipment" item which conforms to contract documents.

1.7 QUALITY ASSURANCE

A. Manufactures of equipment shall be firms regularly engaged in the production of factory fabricated systems and equipment whose products have been in satisfactory use in similar service for not less than three (3) years.

B. Suppliers of equipment must have factory trained and authorized personnel for the service of all equipment provided

1.8 DEFINITIONS

As Called For	Materials, equipment including the execution specified/shown in the Contract Documents.
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts chases or recesses, inside walls, above ceilings, in slabs or below grade.
Design Equipment	Refer to the article, BASIS OF DESIGN.
Design Make	Refer to the article, BASIS OF DESIGN.
Exposed	Work not identified as concealed.
Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
Furnished by Others	Receive delivery at job site or where called for and install.
Inspection	Visual observations by Owner's Site Representative.
Install	Mount or place equipment and connect complete and operational.
Labeled	Refers to classification by a standards

	agency.
Make	Refer to the article BASIS OF DESIGN.
Provide	Furnish and install complete.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Replace	Remove and provide new item.
Review	A general contractual conformance check of specified products.
Roughing	Pipe, duct, conduit, equipment layout and installation.
Satisfactory	As specified in Contract Documents.
Site Representative	Construction Manager or Owner's Inspector at the work site.

Refer to General Conditions of the Contract for additional information.

PART 2 PRODUCTS

2.1 MATERIALS

A. All materials, unless otherwise specified, shall be new and be the standard products of the manufacturer. Used equipment or damaged material will be rejected.

B. The listing of a manufacturer as “acceptable” does not indicate acceptance of a standard or catalogued item of equipment. All equipment and systems conform to the Specifications.

2.2 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

A. Refer to Division 01 for general requirements. All products specified in an individual Division 26 section shall be submitted at the same time. Number each submittal. Indicate deviations from contract requirements on Letter of Transmittal. Corrections or comments made on the Shop Drawings during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

2.3 U.L. LISTING

A. Equipment shall bear the Underwriter's Laboratories (UL), or other approved agency listing label. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with the National Electric Code and listed by U.L.

2.4 FIRE STOPPING

A. Fire-stopping for Openings through Fire and Smoke Rated Walls and Floor Assemblies shall be listed or classified by an approved independent testing laboratory for "Through-Penetration Fire-Stop Systems." The system shall meet the requirements of "Fire Tests of Through-Penetration Fire-Stops" designated ASTM E814.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. Thomas & Betts - S-100 FS500/600,
4. Carborundum Fyre Putty.
5. Hilti Firestop Systems

PART 3 EXECUTION

3.1 SEALING AND FIRESTOPPING

A. Installation of Fire-stopping for Openings through Fire and Smoke Rated Walls and Floor Assemblies shall be as follows:

1. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for dry wall construction.
2. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.

3. The methods used shall incorporate qualities that permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.

4. Provide rigid steel sleeves where non-armored cables pass through fire rated walls and barriers.

3.2 SUPPORTS

A. Provide required supports for work of this Contract, including beams, angles, channel, hangers, rods, columns, plates, bases, braces, etc. to properly support all work.

B. Provide steel angles, channels and other materials necessary for the proper support and erection of motor starters, distribution panelboards, large disconnect switches, pendant-mounted lighting fixtures, etc.

3.3 CONCEALMENT

A. Unless otherwise specifically indicated, all work shall be concealed above ceiling space, in wall space, below slabs in crawl spaces, and elsewhere throughout the building.

B. In areas with no ceilings, install only after Architect reviews and comments on arrangement and appearance.

3.4 PAINTING

A. This Contract includes the following:

1. Painting for all cut and patch work performed as part of Division 26 contract.

2. Painting required for touch-up of surfaces damaged due to the installation of electrical work.

3. Painting as required to repair finish of equipment furnished.

4. Painting of all surface mounted raceways in finished areas.

3.5 CLEANING

A. After all tests are made and installations completed satisfactorily:

B. Thoroughly clean entire installation, both exposed surfaces and interiors.

C. Remove all debris caused by work.

D. Remove tools, surplus, materials, when work is finally accepted.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single conductor building wire.

B. Wiring connectors.

C. Electrical tape.

D. Wire pulling lubricant.

E. Cable ties.

1.2 RELATED REQUIREMENTS

A. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

H. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

I. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

J. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

K. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

L. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.

3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Provide new conductors and cables manufactured not more than one year prior to installation.

D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

E. Comply with NEMA WC 70.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:

1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.

2. Copper Conductors: Soft drawn annealed, 98 percent conductivity. Single conductor copper cable complying with ASTM B3 and ASTM B8 with flame-retardant, moisture- and heat-resistant insulation rated for 90 degrees C in dry or wet locations, listed by UL as Type XHHW-2 or RHW-2 complying with UL 44.

3. Tinned Copper Conductors: Comply with ASTM B33.

H. Minimum Conductor Size:

1. Branch Circuits: 12 AWG.
   a. Exceptions:
      1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
      2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.

2. Control Circuits: 14 AWG.

I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

J. Conductor Color Coding:

1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.

2. Color Coding Method: Integrally colored insulation.
   a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.

3. Color Code:
   a. 208Y/120 V, 3 Phase, 4 Wire System:
      1) Phase A: Black.
      2) Phase B: Red.
      3) Phase C: Blue.
      4) Neutral/Grounded: White.
   b. Equipment Ground, All Systems: Green.
   c. 480/277 V, 3 Phase, 4 Wire System:
      1) Phase A: Brown.
      2) Phase B: Orange.
      3) Phase C: Yellow.
      4) Neutral/Grounded: White.

2.2 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:

1. Copper Building Wire:
   a. Cerro Wire LLC: www.cerrowire.com.
   b. Encore Wire Corporation: www.encorewire.com.
   c. Southwire Company: www.southwire.com.
   d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:

1. Feeders and Branch Circuits:
   a. Size 10 AWG and Smaller: Solid.
   b. Size 8 AWG and Larger: Stranded.

2. Control Circuits: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:

1. Copper Building Wire: Type XHHW-2 or RHW-2, except as indicated below.
   a. Fixture Wiring Within Luminaires: Type TFFN/TFN for luminaires with labeled maximum temperature of 90 degrees C; Approved suitable type for luminaires with labeled maximum temperature greater than 90 degrees C.

2.3 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Wiring Connectors for Splices and Taps:

1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.

C. Wiring Connectors for Terminations:

1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.

2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.

3. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.

4. Conductors for Control Circuits: Use crimped terminals for all connections.

D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

1. Manufacturers:
   a. 3M: www.3m.com.
   b. Ideal Industries, Inc: www.idealindustries.com.
   c. NSI Industries LLC: www.nsiindustries.com.

G. Mechanical Connectors: Provide bolted type or set-screw type.

1. Manufacturers:
   a. Burndy: www.burndy.com.
   b. Ilsco: www.ilsco.com.
   c. Thomas & Betts Corporation: www.tnb.com.
   d. Substitutions: See Section 01 60 00 - Product Requirements.

H. Compression Connectors: Provide circumferential type or hex type crimp configuration.

1. Manufacturers:
   a. Burndy: www.burndy.com.
   b. Ilsco: www.ilsco.com.
   c. Thomas & Betts Corporation: www.tnb.com.
   d. Substitutions: See Section 01 60 00 - Product Requirements.

I. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

1. Manufacturers:
   a. Burndy: www.burndy.com.
   b. Ilsco: www.ilsco.com.
   c. Thomas & Betts Corporation: www.tnb.com.
   d. Substitutions: See Section 01 60 00 - Product Requirements.

2.4 WIRING ACCESSORIES

A. Electrical Tape:

1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.

2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D. Utilize splices with heat shrink tubing for spices in field boxes for site lighting and signage.

1. Manufacturers:
   a. 3M: www.3m.com.
   b. Burndy: www.burndy.com.
   c. Thomas & Betts Corporation: www.tnb.com.

C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

1. Manufacturers:
   a. 3M: www.3m.com.
   b. American Polywater Corporation: www.polywater.com.
   c. Ideal Industries, Inc: www.idealindustries.com.

d. Substitutions: See Section 01 60 00 - Product Requirements.

D. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as shown on the drawings.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.3 INSTALLATION

A. Circuiting Requirements:

1. Unless dimensioned, circuit routing indicated is diagrammatic.

2. When circuit destination is indicated and routing is not shown, determine exact routing required.

3. Arrange circuiting to minimize splices.

4. Include circuit lengths required to install connected devices within 10 ft of location shown.

5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.

6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are shown as separate, combining them together in a single raceway is permitted, under the following conditions:
   a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
   b. Increase size of conductors as required to account for ampacity derating.
   c. Size raceways, boxes, etc. to accommodate conductors.

7. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is permitted where not otherwise prohibited, except for the following:
   a. Branch circuits fed from ground fault circuit interrupter (GFCI) circuit breakers.
   b. Branch circuits fed from feed-through protection of GFI receptacles.
   c. Branch circuits with dimming controls.
   d. Branch circuits with isolated grounding conductor.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Installation in Raceway:

1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.

2. Pull all conductors and cables together into raceway at same time.

3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.

4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

G. Install conductors with a minimum of 12 inches of slack at each outlet.

H. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

I. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

J. Make wiring connections using specified wiring connectors.

1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.

2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.

3. Do not remove conductor strands to facilitate insertion into connector.

4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

K. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

L. Insulate ends of spare conductors using vinyl insulating electrical tape.

M. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

N. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.4 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Control, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 05 23

INSTRUMENTATION AND COMMUNICATION CABLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals shown, specified, and required to furnish and install communication cables.

2. Types of cables include the following:
   a. Data communication cables.

B. Related Sections:

1. Section 26 05 34, Conduits.

2. Section 26 05 53, Identification for Electrical Systems.

1.2 TERMINOLOGY

A. The following words or terms are not defined but, when used in this Section, have the following meaning:

1. “CPE” means chlorinated polyethylene.

2. “FEP” means fluorinated ethylene-propylene.

3. “XLPE” means cross-linked polyethylene.

1.3 REFERENCES

A. Standards referenced in this Section are:

1. ASTM A510, Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.

2. ASTM B633, Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

3. ANSI/TIA/EIA-568, Commercial Building Telecommunications Cabling (requirements and restrictions of Technical Service Bulletins (TSBs) apply.)

4. TIA/EIA-485, Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems (known as RS-485).

5. UL 13, Power-Limited Circuit Cables.

6. UL 1581, Electrical Wires, Cables and Flexible Cords.

7. UL VW-1, Vertical Wire Flame Test.

8. UL 910, Safety Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. NEC 725, Class 1, Class 2, and Class 3 Remote-Control, Signaling and Power-Limited Circuits.

2. NEC 800, Communications Circuits.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data: Manufacturer's technical information for instrumentation cables and communications cables proposed.

B. Informational Submittals: Submit the following:

1. Field Quality Control Submittals: Written report of results of field quality control testing specified in this Section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. Cables shall bear the UL label.

B. Horizontal Unshielded Twisted Pair (UTP) Cables:

1. Horizontal cabling is cabling between and including the telecommunications outlet/connector and patch panel or termination block.

2. Manufacturers: Provide products of one of the following:
   a. Bertek.
   b. Belden.
   c. Mohawk
   d. Or equal.

3. Cables shall consist of no. 24 AWG, thermoplastic-insulated, solid conductors formed into four individually twisted pairs and enclosed by thermoplastic jacket.

4. Comply with ANSI/TIA/EIA-568, Part 10.2.

5. Riser-rated where installed in conduit. Other installations shall be plenum-rated.

6. Rated for Category 6 use.

C. Patch Cords:

1. Patch cords are used for connecting patch panel to hub, or wall jack to equipment.

2. Manufacturer: Provide products of one of the following:
   a. Bertek.
   b. Belden.
   c. Mohawk
   d. Or equal.

3. Cables shall consist of no. 24 AWG, thermoplastic-insulated, stranded conductors formed into four individually twisted pairs and enclosed by thermoplastic jacket.

4. Cables shall be riser-rated.

5. Rated for Category 6 use.

6. Cables shall incorporate integral strain relief into the connector at each end. Connectors shall be RJ45 plugs.

7. Provide the following patch cords:
   a. One 10-foot cable per wall jack installed.
   b. One 3-foot cable per every two wall jacks installed.
   c. One 5-foot cable per every two wall jacks installed.

D. Connecting Hardware for Unshielded Twisted Pair (UTP) Cables:

1. Hardware used to terminate UTP cable shall comply with ANSI/TIA/EIA-568, Part 10.4.

2. Connecting hardware shall be compatible with wiring specified in the Contract Documents.

3. Rated for Category 6 use.

4. Connecting hardware shall utilize 110-type terminal blocks to coordinate with patch panels and termination blocks specified the Contract Documents.

5. Telecommunications Outlets/Connectors:
   a. Manufacturers: Provide products of one of the following:
      1) Hubbell.
      2) Or equal.
   b. Outlets and connectors shall utilize RJ45 (eight-pin modular) plug/receptacle configuration.
   c. Outlets and connectors shall utilize T568B pin/pair assignments and be coordinated with wire type (solid or stranded conductor).
   d. Outlets shall be flush-mount type or surface-mount type, as indicated on the Drawings.

E. Cable Support Hardware:

1. Conduit:
   a. Where conduit is shown or indicated on the Drawings, comply with Section 26 05 3, Conduits.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:

1. Install cables complete with proper terminations at both ends.

2. Install in conduit separate from power cables, unless shown or indicated otherwise.

3. Ground shield on shielded cables at one end only and as recommended by instrument manufacturer.

4. Identify conductors in accordance with Section 26 05 53, Identification for Electrical Systems.

5. Install and terminate Supplier-furnished cable in accordance with equipment manufacturer requirements and cable manufacturer's recommendations.

6. Install in accordance with Laws and Regulations, including NEC.

3.3 FIELD QUALITY CONTROL

A. Site Tests:

1. Test shielded instrumentation cable shields with ohmmeter for continuity along full length of cables, and for shield continuity to ground.

2. Connect shielded instrumentation cables to calibrated 4 to 20 mA dc signal transmitter and receiver. Test at 4 and 20 mA transmitter settings.

3. Replace with new cables the full length of cables that fail test.

4. CONTRACTOR shall provide test equipment.

5. For testing of communications cables, test equipment used shall comply with the following:
   a. Equipment shall consist of a “master” and a “remote” unit.
   b. Test of all aspects of cables shall be automatic and initiated with a single command. Test over entire frequency range. Test unit shall be capable of accepting cable identification tag for reporting. Test unit shall return “pass/fail” status for cables and, if “fail,” shall indicate reason for failure.
   c. Test unit shall be capable of storing all test results internally and printing the results later.
   d. For unshielded twisted pair cables, test unit shall be specifically designed and manufactured to certify cabling relative to Category 6 compliant.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install complete grounding for electrical systems, structures, and equipment.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ANSI/NETA ATS, Acceptance Testing Specifications for Electrical Power Equipment and Systems.

2. ASTM B8, Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft.

3. UL 467, Grounding and Bonding Equipment.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Field Acceptance Testing Firm: Retain services of independent testing firm to perform acceptance field testing of grounding system. Testing firm shall have experience in testing grounding systems and shall be a member company of NETA.

B. Regulatory Requirements

1. National Electrical Code, (NEC).
   a. NEC Article 250, Grounding and Bonding.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Listing of grounding connector types identifying where each will be used.

   b. Layouts of each structure's ground grid.

2. Product Data:
   a. Manufacturer's technical information for grounding materials proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bare Ground Cable:

1. Manufacturers: Provide products of one of the following:
   a. Cablec Corporation.
   b. General Cable Corporation.
   c. Southwire Cable Company.
   d. Or equal.

2. Material: Soft-drawn, bare copper stranded cable complying with ASTM B8. No. 4/0 AWG minimum size unless otherwise shown or indicated on the Drawings.

B. Equipment Grounding Conductors:

1. Manufacturers: Provide products of one of the following:
   a. Cablec Corporation .
   b. General Cable Corporation.
   c. Southwire Cable Company.
   d. Or equal.

2. Provide insulated ground conductor as indicated on the contract documents.

3. When not specifically indicated on the contract documents and associated with a feeder or branch circuit, use the same size conductor as the feeder or branch circuit.

4. Provide #6 insulated ground conductor to cable trays, equipment racks, etc. unless indicated otherwise.

C. Ground Rods:

1. Manufacturers: Provide products of one of the following:
   a. Copperweld, Bimetallics Division.
   b. ITT Blackburn Company.
   c. Or equal.

2. Material: Copper-clad rigid steel rods, 3/4-inch diameter, ten feet long.

D. Grounding Connectors:

1. Products and Manufacturers: Provide one of the following:
   a. Pressure Connectors:
      1) O.Z./Gedney, Division of General Signal Corporation.
      2) Burndy Corporation.
      3) Or equal.

2. Material: Pressure connectors shall be copper alloy castings, designed and fabricated specifically for items to be connected and assembled with Durium or silicone bronze bolts, nuts, and washers.

E. Ground system components shall comply with UL 467.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions for the Work and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 STRUCTURE GROUND SYSTEM

A. Provide ground grids as shown and indicated on the Drawings.

B. Provide No. 4/0 bare copper cable ground grid at not less than 2.5 feet below grade, unless otherwise shown or indicated on the Contract Documents.

3.3 EQUIPMENT GROUNDING

A. Ground electrical equipment in compliance with Laws and Regulations and the Contract Documents.

B. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing. Use flexible straps for vibrating/moveable equipment.

C. Equipment grounding conductors shall be bare stranded copper cable of adequate size installed in metal conduit where required for mechanical protection. Ground conductors, pulled into conduits with non-grounded conductors, shall be insulated. Insulation shall be green.

D. Control panels grounding conductors shall be bare stranded copper cable of adequate size to ground grid from AC ground bus, and an insulated stranded copper cable of adequate size to ground grid from DC ground bus.

E. Connect ground conductors to conduit with copper clamps, straps, or with grounding bushings.

F. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC or as indicated on drawings. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes, receptacle outlet boxes or metal enclosures of electrical distribution system and service equipment per NEC. Ground conduits by means of grounding bushings on terminations at panel boards with minimum installed #12 insulated conductor to grounding system.

G. Connect to piping by welding or brazing. Use copper bonding jumpers on gasketed joints.

H. Connect to equipment by means of lug compressed on cable end. Bolt lug to equipment frame using holes or terminals provided on equipment specifically for grounding. Do not use hold-down bolts. Where grounding provisions are not included, drill suitable holes in locations recommended by equipment manufacturer or designated by ENGINEER.

I. Connect to motors by bolting directly to motor frames, not to soleplates or supporting structures.

J. Scrape bolted surfaces clean and coat with conductive oxide-resistant compound.

K. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.4 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

1. Perform acceptance testing of grounding system. Testing shall be performed by testing firm in accordance with ANSI/NETA ATS.

2. Test Equipment, Calibration and Reporting: Test equipment, instrument calibration, and test reports shall comply with ANSI/NETA ATS.

B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

C. Perform continuity testing on all grounds in accordance with IEEE 142.

D. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.2 RELATED REQUIREMENTS

A. Section 26 05 34 - Conduit: Additional support and attachment requirements for conduits.

B. Section 26 05 37 - Boxes: Additional support and attachment requirements for boxes.

1.3 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.

2. Coordinate the work with other trades to provide additional framing and materials required for installation.

3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.

2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.

4. Do not use products for applications other than as permitted by NFPA 70 and product listing.

5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
   a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
   b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
   c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
   d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.

1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.

2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.

1. Comply with MFMA-4.

2. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.

3. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.

4. Manufacturers:
   a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com.
   b. Thomas & Betts Corporation: www.tnb.com.
   c. Unistrut, a brand of Atkore International Inc: www.unistrut.com.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

1. Minimum Size, Unless Otherwise Indicated or Required:
   a. Equipment Supports: 1/2 inch diameter.
   b. Single Conduit up to 1 inch (27mm) trade size: 1/4 inch diameter.
   c. Single Conduit larger than 1 inch (27mm) trade size: 3/8 inch diameter.
   d. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
   e. Outlet Boxes: 1/4 inch diameter.
   f. Luminaires: 1/4 inch diameter.

F. Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.

3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.

4. Hollow Masonry: Use toggle bolts.

5. Hollow Stud Walls: Use toggle bolts.

6. Steel: Use beam clamps, machine bolts, or welded threaded studs.

7. Sheet Metal: Use sheet metal screws.

8. Wood: Use wood screws.

9. Powder-actuated fasteners are not permitted.

10. Hammer-driven anchors and fasteners are not permitted.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, ceiling grid, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

G. Secure fasteners according to manufacturer's recommended torque settings.

H. Remove temporary supports.

END OF SECTION

SECTION 26 05 34

CONDUIT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Liquid tight flexible metal conduit (LFMC).

B. Electrical metallic tubing (EMT).

C. Rigid Steel Conduit (RGS).

D. Non-Metallic Conduit (PVC).

E. Conduit fittings.

1.2 RELATED REQUIREMENTS

A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

B. Section 26 05 37 - Boxes.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

F. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

G. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

H. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.

4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.

5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements.

C. Concealed Within Hollow Stud Walls: Unless otherwise noted (fire alarm) use electrical metallic tubing (EMT).

D. Concealed Above Accessible Ceilings: Unless otherwise noted (fire alarm) use electrical metallic tubing (EMT).

E. Exposed, Interior: Use electrical metallic tubing (EMT).

F. Underground direct buried: Use Non-Metallic Conduit (PVC).

G. Connections to Vibrating Equipment:

1. Damp, Wet, or Corrosive Locations: Use liquid tight flexible metal conduit.

2. Maximum Length: 6 feet unless otherwise indicated.

3. Vibrating equipment includes, but is not limited to:
   a. Motors and roof mounted mechanical units.

2.2 CONDUIT REQUIREMENTS

A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Minimum Conduit Size, Unless Otherwise Indicated:

1. Branch Circuits: 3/4 inch (16 mm) trade size.

2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.

3. Control Circuits: 1/2 inch (16 mm) trade size.

4. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.

D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.3 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

2.5 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

3. Connectors and Couplings: Use compression (gland) or set-screw type.

4. Do not use indenter type connectors and couplings.

2.6 RIGID STEEL CONDUIT (RGS)

A. Description: NFPA 70, Type RGS rigid steel conduit tubing complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use rigid, heavy-wall, mild steel, hot-dip galvanized, smooth interior, tapered threads and carefully reamed ends; 3/4-inch NPS minimum size.

2.7 NON-METALLIC CONDUIT

A. PVC Plastic Conduit:

1. Manufacturers: Provide products of one of the following:
   a. Amoco Chemicals Corp.
   b. Carlon Electrical Products.
   c. Or equal.

2. Material: Schedule 80 PVC, rated for 90 degrees C, complying with NEMA TC3 and UL 514B and 651.

3. Fittings: Form elbows, bodies, terminations, expansions, and fasteners of same material and manufacturer as base conduit. Provide cement by same manufacturer as base conduit.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Conduit Support:

1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

3. Installation above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.

D. Connections and Terminations:

1. Provide drip loops for liquid tight flexible conduit connections to prevent drainage of liquid into connectors.

2. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.

3. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

E. Penetrations:

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.

2. Make penetrations perpendicular to surfaces unless otherwise indicated.

3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.

4. Conceal bends for conduit risers emerging above ground.

5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.

6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.

7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.

8. Install firestopping to preserve fire resistance rating of partitions and other elements.

F. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection.

2. Where conduits are subject to earth movement by settlement or frost.

G. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:

1. Where conduits pass from outdoors into conditioned interior spaces.

2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

3.2 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.3 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 05 37

BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

1.2 RELATED REQUIREMENTS

A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

B. Section 26 05 34 - Conduit:

1. Conduit bodies and other fittings.

2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

C. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.1 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.

2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.

3. Provide products listed, classified, and labeled as suitable for the purpose intended.

4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.

2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.

3. Use raised covers suitable for the type of wall construction and device configuration where required.

4. Use shallow boxes where required by the type of wall construction.

5. Do not use "through-wall" boxes designed for access from both sides of wall.

6. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.

7. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Box Locations:

1. Locate boxes to be accessible. Provide access panels as required where approved by the Architect.

2. Locate boxes as required for devices installed under other sections or by others.
   a. Switches, receptacles, and other wiring devices.

3. Locate boxes so that wall plates do not span different building finishes.

4. Locate boxes so that wall plates do not cross masonry joints.

E. Box Supports:

1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

F. Install boxes plumb and level.

G. Flush-Mounted Boxes:

1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.

2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.

3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

H. Install boxes as required to preserve insulation integrity.

I. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

J. Install firestopping to preserve fire resistance rating of partitions and other elements.

K. Close unused box openings.

L. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

END OF SECTION

SECTION 26 05 43.13

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install underground ductbanks.

B. Coordination:

1. Ductbank routing on the Drawings is diagrammatic. Coordinate installation with piping and other Underground Facilities and locate ductbanks clear of interferences.

2. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before underground ductbank Work.

3. Notify other contractors in advance of installing underground ductbanks to provide other contractors with sufficient time for installing items included in their contracts that will be installed with or before underground ductbank Work.

C. Related Sections:

1. Section 26 05 26, Grounding and Bonding for Electrical Systems.

2. Section 26 05 53, Identification for Electrical Systems.

3. Section 26 05 34, Conduit.

1.2 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Layouts showing proposed routing of direct buried conduit.
   b. Profiles of direct buried conduit showing crossings with piping and other Underground Facilities.
   c. Typical cross sections for each direct buried conduit run.

B. Informational Submittals: Submit the following:

1. Special Procedure Submittals:
   a. Installation procedures.

2. Field Quality Control Submittals:
   a. Field test report.

C. Closeout Submittals: Submit the following:

1. Record Drawings:
   a. Include actual routing of underground direct buried conduit runs on record documents in accordance with Section 01 78 39, Project Record Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Duct: Provide conduit and fittings in accordance with Section 26 05 34, Conduit. Conduit types shall be as follows:

1. Schedule 80 PVC conduits, direct buried, for power circuits. All bends, elbows, and sweeps of 45-degrees or larger shall be rigid steel.

B. Backfill: Provide backfill, including select backfill, in accordance with Section 31 23 23.

C. Grounding: Provide ground cable in accordance with Section 26 05 26, Grounding and Bonding for Electrical Systems.

D. Duct Sealing Compound:

1. Products and Manufacturers: Provide one of the following:
   a. O-Z/Gedney, Type DUX.
   b. Or equal.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Excavation and Backfilling:

1. Provide excavation and backfilling for direct buried conduit installation in accordance with Section 31 23 23.

2. Do not backfill with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material, or other materials that can damage or contribute to corrosion of ducts or cables or prevent adequate compaction of backfill.

B. Ductbank Layout:

1. Top of direct buried conduit shall be a minimum of 2.5 feet below grade, unless shown or indicated otherwise on the Drawings.

2. Slope direct buried conduit runs for drainage toward manholes and away from buildings with slope of approximately three inches vertical per 100 feet of run.

C. Conduit Transitions:

1. Conduit installations shall be watertight throughout entire length of direct buried conduit run.

2. Transition from non-metallic to galvanized rigid steel conduit where conduits enter structure walls and slabs.

3. Terminate conduits in insulated grounding bushings.

4. Continue conduits inside buildings in accordance with Section 26 05 34, Conduit, and as shown or indicated in the Contract Documents.

5. Plug and seal empty spare conduits entering structures. Conduits in use entering structures shall be sealed watertight with duct sealing compound.

D. Detectable Underground Warning Tape:

1. Provide detectable underground warning tapes complying with Section 26 05 53, Identification for Electrical Systems, over the full length of each underground direct buried conduit run.

2. Install warning tapes approximately 12 inches below grade.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Warning signs and labels.

1.2 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.3 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 70E - Standard for Electrical Safety in the Workplace; 2015.

E. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

PART 2 PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.

B. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.

C. Identification for Raceways:

1. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.

2. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.

D. Identification for Devices:

1. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Manufacturers:
   a. Brimar Industries, Inc: www.brimar.com.
   b. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
   c. Seton Identification Products: www.seton.com.

2. Materials:
   a. Indoor Clean, Dry Locations: Use plastic nameplates.
   b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.

3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.

4. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Manufacturers:
   a. Brady Corporation: www.bradyid.com.
   b. Brother International Corporation: www.brother-usa.com.

2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.

3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

2.3 WIRE AND CABLE MARKERS

A. Manufacturers:

1. Brady Corporation: www.bradyid.com.

2. HellermannTyton: www.hellermanntyton.com.

3. Panduit Corp: www.panduit.com.

B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

D. Legend: Power source and circuit number or other designation indicated.

E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

F. Minimum Text Height: 1/8 inch.

G. Color: Black text on white background unless otherwise indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:

1. Surface-Mounted Equipment: Enclosure front.

2. Flush-Mounted Equipment: Inside of equipment door.

3. Branch Devices: Adjacent to device.

4. Interior Components: Legible from the point of access.

5. Conduits: Legible from the floor.

6. Boxes: Outside face of cover.

7. Conductors and Cables: Legible from the point of access.

8. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

E. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

SECTION 26 09 24

LIGHTING CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single space wired lighting control systems and associated components:

1. Wired occupancy sensors.
2. Lighting control modules (Room Controllers).
3. Wired load control modules with wireless communication inputs.
4. Wired wall dimmers and switches with communication inputs.
5. Wired daylight sensors.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

C. Section 26 51 00 - Interior Lighting.

1.3 REFERENCE STANDARDS

A. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; 2002a (Reapproved 2010).

B. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; 2008.

C. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).

D. ISO 9001 - Quality Management Systems-Requirements; 2008.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; 2010.

G. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2010).

H. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

J. UL 508 - Industrial Control Equipment; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

K. UL 1472 - Solid-State Dimming Controls; 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. NYSERDA, Utility or other grants related to lighting upgrades: Provide all documentation including purchasing, paid detailed invoices required for grant applications for the owner.

C. Sequencing:

1. Do not install sensors and wall controls until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Design Documents: 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. Samples:

1. Wall Controls:
   a. Show available color and finish selections.

2. Sensors: Provide one sample(s) for each product proposed for substitution upon request.

E. 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.

F. Project Record Documents: Record actual installed locations and settings for lighting control system components.

G. Operation and Maintenance Data: Include detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

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 FIELD CONDITIONS

A. Maintain field conditions within manufacturers required service conditions during and after installation.

1. Basis of Design System Requirements Eaton Room Controller, Unless Otherwise Indicated:
   a. Ambient Temperature:
      1) Lighting Control System Components, Between 32 and 104 degrees F.
   b. Relative Humidity: Less than 90 percent, non-condensing.
   c. Protect lighting controls from dust.

1.8 WARRANTY

A. See Section 01 70 00 - Execution Requirements, for additional warranty requirements.

B. Manufacturer's Standard Warranty, With Manufacturer Start-Up:

1. Manufacturer Lighting Control System Components, Except Ballasts/Drivers and Ballast Modules:
   a. First Two Years:
      1) 100 percent replacement parts coverage, 100 percent manufacturer labor coverage to troubleshoot and diagnose a lighting issue.
      2) First-available on-site or remote response time.
   b. Telephone Technical Support: Available 24 hours per day, 7 days per week, excluding manufacturer holidays.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Crestron Lighting, ZUM Wired (this system currently exists within the school district).

1. Acceptable Manufacturers: Acuity Controls nLight Wired.

B. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval a minimum of 10 working days prior to the bid date and must be made available to all bidders. The Contractor shall be responsible for design modifications associated with the proposed substitution.

C. Networked Lighting Fixtures shall be able to digitally network directly to network control devices (sensors, switches, dimmers).

2.2 LIGHTING CONTROLS - GENERAL REQUIREMENTS

A. Sensor Layout and Tuning: Include as part of the base bid additional costs for Lighting Control Manufacturer's Sensor Layout and Tuning service.

1. Lighting Control Manufacturer to take full responsibility for wired 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 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 to 104 degrees F 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 up to 10 years and subsequently restored, lights to automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.

G. Device Finishes:

1. Standard Colors: Comply with NEMA WD1 where applicable. Finish shall be white.

2. Visible Parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.

2.3 LIGHTING SENSORS

A. Provide lighting control modules as indicated or as required to control the loads as indicated. Room controllers are required for all spaces with occupancy sensor, photo sensor and dimming, on-off control.

1. Communicates directly via Cat 5e data cable.

2. Capable of being placed in test mode to verify correct operation from the face of the unit.

B. Wired Occupancy/Vacancy Sensors:

1. General Requirements:

a. Provide dual-technology type, manual ON/automatic OFF operation.

b. Provides a clearly visible method of indication to verify that motion is being detected during testing and that the unit is communicating to compatible controllers.

c. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.

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 (initial setting shall be 15 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: Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.

l. Wall-Switch Type: Provide line-voltage type sensors for control of lighting circuit in spaces shown. Manual ON/Automatic OFF operation, dual-technology type.

C. Wired Daylight Sensors:

1. Open-loop basis for daylight sensor control scheme.

2. Open-loop basis for daylight sensor control scheme

3. Partially shielded for accurate detection of available daylight to prevent fixture lighting and horizontal light component from skewing sensor detection.

4. Provide linear response from 2 to 150- foot candles.

5. Color: White.

6. Mounting: Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting. 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.

2.4 LIGHTING CONTROL MODULES

A. Provide lighting control modules as indicated or as required to control the loads as indicated. Room controllers are required for all spaces with occupancy sensor, photo sensor and dimming, on-off control.

B. General Requirements:

1. Delivered and installed as a listed factory-assembled panel.

2. Passively cooled via free-convection, unaided by fans or other means.

3. Mounting: Surface.

4. Connection without interface to wired:
   a. Occupancy sensors.
   b. Daylight sensors.
   c. IR receivers for personal control.

5. LED status indicators confirm communication with occupancy sensors, daylight sensors, and IR receivers.

6. Contact Closure Input:
   a. Directly accept contact closure input from a dry contact closure or sold-state output without interface to:
      1) Activate scenes.
         (a) Scene activation from momentary or maintained closure.
      2) Enable or disable after hours.
         (a) Automatic sweep to user-specified level after user-specified time has elapsed.
         (b) System will provide occupants a visual warning prior to sweeping lights to user-specified level.
         (c) Occupant can reset timeout by interacting with the lighting system.
      3) Activate or deactivate demand response (load shed). Load shed event will reduce lighting load by user-specified amount.

7. Emergency Contact Closure Input:
   a. Turn all zones to full output during emergency state via direct contact closure input from UL 924 listed emergency lighting interface, security system or fire alarm system.
   b. Allow configurable zone response during emergency state.
   c. Disable control operation until emergency signal is cleared.

8. Supplies power for control link for keypads and control interfaces.

9. Distributes sensor data among multiple lighting control modules.

10. Capable of being controlled via wireless sensors and controls.

C. 0-10V Lighting Control Modules:

1. Products:
   a. Crestron Zumlink; Model ZUMLINK-JBOX-16A-LV: 16 A continuous-use per channel. Or accepted equal.

2. Coordination Between Low Voltage Dimming Module and Line Voltage Relay: Capable of being electronically linked to single zone.

3. Single low voltage dimming module; capable of controlling following light sources:
   a. 0-10V analog voltage signal.
      1) Provide Class 2 isolated 0-10V output signal conforming to IEC 60929.
      2) Sink current per IEC 60929.

4. Switching:
   a. Rated Life of Relay: Typical of 1,000,000 cycles at fully rated 16 A for all lighting loads.
   b. Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits.
   c. Fully rated output continuous duty for inductive, capacitive, and resistive loads.
   d. Module to integrate up to four individually controlled zones.
   e. Utilize air gap off, activated when user selects "off" at any control to disconnect the load from line supply.

2.5 LOAD CONTROL MODULES (ROOM CONTROLLERS)

A. Provide wired load control modules as indicated or as required to control the loads as indicated.

B. General Requirements:

1. Listed to UL 508 as industrial control equipment.

2. Delivered and installed as a listed factory-assembled panel.

3. Passively cooled via free-convection, unaided by fans or other means.

4. Mounting: Surface.

5. Connection without interface to wired:
   a. Occupancy sensors.
   b. Daylight sensors.
   c. IR receivers for personal control.

6. Connects to lighting management hub via RS485.

7. LED status indicators confirm communication with occupancy sensors, daylight sensors, and IR receivers.

8. Contact Closure Input:
    a. Directly accept contact closure input from a dry contact closure or solid-state output without interface to:
        1) Activate scenes.
            (a) Scene activation from momentary or maintained closure.
        2) Enable or disable after hours.
            (a) Automatic sweep to user-specified level after user-specified time has elapsed.
            (b) System will provide occupants a visual warning prior to sweeping lights to user-specified level.
            (c) Occupant can reset timeout by interacting with the lighting system.
        3) Activate or deactivate demand response (load shed).
            (a) Load shed event will reduce lighting load by user-specified amount.

9. Emergency Contact Closure Input:
    a. Turn all zones to full output during emergency state via direct contact closure input from UL 924 listed emergency lighting interface, security system or fire alarm system.
    b. Allow configurable zone response during emergency state.
    c. Disable control operation until emergency signal is cleared.

10. Supplies power for control link for keypads and control interfaces.

11. Distributes sensor data among multiple lighting control modules.

12. Capable of being controlled via wireless sensors and controls.

C. 0-10V Lighting Control Modules:

1. Product(s):
    a. Crestron Zumlink; Model ZUMLINK-JBOX-16A-LV: 16 A continuous-use per channel.

2. Coordination between Low Voltage Dimming Module and Line Voltage Relay: Capable of being electronically linked to single zone.

3. Single low voltage dimming module; capable of controlling following light sources:
    a. 0-10V analog voltage signal.
        1) Provide Class 2 isolated 0-10V output signal conforming to IEC 60929.
        2) Sink current per IEC 60929.
    b. 10V-0V analog voltage signal.
        1) Provide Class 2 isolated 0-10V output signal conforming to IEC 60929.
        2) Sink current per IEC 60929.

4. Switching:
    a. Rated Life of Relay: Typical of 1,000,000 cycles at fully rated 16 A for all lighting loads.
    b. Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits.
    c. Fully rated output continuous duty for inductive, capacitive, and resistive loads.
    d. Module to integrate up to four individually controlled zones.
    e. Utilize air gap off, activated when user selects "off" at any control to disconnect the load from line supply.

2.6 WALL CONTROL STATIONS

A. Product(s):

1. Type 8-Button with ON/OFF/Raise/Lower Control. Coordinate exact button layout and quantity with Drawings.

2. ON/OFF Control.

B. Quantity: As indicated on the drawings.

C. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling, Lutron sensor cable CBL 522S.

D. All switches shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate a potential wiring issue.

E. Allows for easy reprogramming without replacing unit.

F. Button Programming:

1. Single action.

G. Includes LED to indicate button press or programming mode status.

H. Mounting:

1. Faceplates: Provide concealed mounting hardware.

PART 3 EXECUTION

3.1 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, except for mounting heights specified in those standards.

B. Install and connect the networked lighting control system components according to the manufacturer's installation instructions, wiring diagrams, the project submittals and plans specifications.

C. Install products in accordance with manufacturer's instructions.

D. The successful bidder shall be responsible for testing of all low voltage network cable included in the bid. Bidder is responsible for verification of the following minimum parameters:

1. Wire Map (continuity, pin termination, shorts and open connections, etc.)

2. Length

3. Insertion Loss

E. Ensure that daylight sensor placement minimizes sensor view of electric light sources.

F. Locate ceiling-mounted and luminaire-mounted daylight sensors to avoid direct view of luminaires.

G. Identify system components in accordance with Section 26 05 53.

3.2 SYSTEM STARTUP

A. Upon completion of installation by the installer, including completion of all required verification and documentation required by the manufacturer, the system shall be started up and programmed.

B. System start-up and programming shall include:

1. Verifying operational communication to all system devices.

2. Programming the network devices into functional control zones to meet the required sequence of operation.

3. Programming and verifying all sequence of operations.

C. Initial start-up and programming is to occur on-site.

3.3 CLOSEOUT ACTIVITIES

A. 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.

END OF SECTION

SECTION 26 22 14

DRY-TYPE LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install dry type low-voltage distribution transformers.

B. Related Sections:

1. Section 26 05 05, General Provisions for Electrical Systems.

2. Section 26 05 26, Grounding and Bonding for Electrical Systems.

3. Section 26 05 53, Identification for Electrical Systems.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. NEMA ST-20, Dry Type Transformers for General Applications.

2. NEMA TP-1, Guide for Determining Energy Efficiency for Distribution Transformers.

3. NEMA TP-2, Standard Test Method for Measuring the Energy Consumption for Distribution Transformers.

4. UL 1561, Dry Type General Purpose and Power Transformers.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. NEC Article 450, Transformers and Transformer Vault (Including Secondary Ties).

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Schedule of transformers to be furnished with ratings and other required technical data.
   b. Proposed location for each transformer, including pad layout, dimensions, and appurtenances.

2. Product Data:
   a. Supplier's technical information for transformers proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Dry Type Two-Winding Transformer:

1. Type: Dry type, air cooled, low temperature rise. Transformers 15 kVA and larger shall be energy efficient, complying with NEMA TP-1 Class 1 efficiency levels. Transformers less than 15 kVA shall be general purpose.

2. Rating: KVA, primary voltage and connection, secondary voltage and connection, frequency and number of phases shall be as shown on the Drawings.

3. Insulation: Insulation and average winding temperature rise (in a 40 degree C maximum ambient) for rated kVA per the following table. Energy efficient transformers shall be capable of 15 percent continuous overload at 150 degrees C temperature rise.

kVA Rating	Insulation Class (degrees C)	Temperature Rise (degrees C)
1 to 15 kVA	185	115
25 to 500 kVA	220	115

4. Winding Taps, Transformers 15 kVA and Less: Two 5-percent below rated voltage, full capacity taps on primary winding.

5. Winding Taps, Transformers 25 kVA and Larger: Two 2-1/2-percent above rated voltage and four 2-1/2+ percent below rated voltage, full capacity taps on primary.

6. Basic impulse level shall be 10 kV.

7. Sound Level: NEMA ST-20 standard.

8. Enclosure: UL listed for the application.

9. Identification: Identify transformers in accordance with Section 26 05 53, Identification for Electrical Systems, with the transformer number and voltages, connection data, kVA ratings, impedance, and overload capacity.

10. Transformers shall comply with NEMA ST-20, NEMA TP-1, NEMA TP-2, and UL 1561.

11. Transformers shall bear the label of the Underwriters' Laboratories, Inc.

B. Non-Linear Load, K Factor Rated Transformer:

1. K Factor rated transformers shall meet the requirements specified in this Section for dry-type two-winding transformers and, in addition, the following:
   a. Type: 100 percent non-linear rated, specifically designed to handle non-linear loads with double size neutral. Transformer shall include an electrostatic shield grounded to the transformer core.
   b. UL K Factor: K = 13.
   c. Impedance: Three percent minimum, five percent maximum.

C. Dry Type Buck and Boost Transformer:

1. Buck and boost transformers shall meet the requirements specified in this Section for dry-type two-winding transformers, except as specified below:
   a. Insulation and average winding temperature rise for rated kVA as follows:

kVA Rating	Insulation Class (degree C)	Temperature Rise (degree C)
0.25 to 2 kVA	185	115
3 to 7.5 kVA	185	115

D. Dry Type Shielded Isolation Transformer:

1. Shielded isolation transformers shall meet the requirements specified in this Section for dry-type two-winding transformers, except as specified below:
   a. Transformers shall be provided with quality, full width electrostatic shields in a maximum effective coupling capacitance between primary and secondary of 33 picofarads. With transformers connected under normal, loaded operating conditions, the attenuation of line noise and transients shall equal or exceed the limits listed in the table in Paragraph 2.1.D.1.b of this Section:

b. Common mode noise attenuation:

Frequency	Attenuation
0 to 1.5k Hz	120 db
1.5 k Hz to 10k Hz	90 db
10 k Hz to 100k Hz	65 db
100 k Hz to 1M Hz	40 db

c. Transverse mode noise attenuation:

Frequency	Attenuation
1.5 to 10k Hz	52 kb
10 to 100k Hz	30 db
100k to 1M Hz	30 db

d. Provide electrostatic shield between the primary and secondary winding and grounded to the transformer core.
e. Isolate core and coil from enclosure using vibration absorbing mounts.

E. Manufacturers: Provide products of one of the following:

1. Cutler-Hammer.
2. General Electric Company.
3. Square D Company.
4. Siemens.
5. Or equal.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the conditions under which the dry type transformers are to be installed and notify Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install transformers on walls or floors at locations shown. Install floor mounted transformers on raised concrete bases. Provide sufficient access and working space for convenient and safe operation and maintenance.

B. Mount transformers so that vibrations are not transmitted to the building structural parts and other equipment. Make connections to transformers with flexible conduit.

C. Adjust tap settings to provide proper voltage at panelboards.

D. Install dry type transformers in conformance with governing codes and manufacturer's instructions and recommendations, and the Contract Documents.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install panelboards.

B. Related Sections:

1. Section 26 05 05, General Provisions for Electrical Systems.

2. Section 26 05 53, Identification for Electrical Systems.

3. Section 26 22 14, Dry-Type Low-Voltage Distribution Transformers

1.2 REFERENCES

A. Standards referenced in this Section are:

1. NEMA PB 1, Panelboards.

2. UL 67, Panelboards.

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Listing of panelboards to be furnished with identification of their proposed location, and all electrical characteristics, including number and rating of branch circuit breakers and enclosure type.

2. Product Data:
   a. Manufacturer's technical information for panelboards proposed for use, including product literature and specifications. Indicate options and features to be provided.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements; Comply with the following:

1. NEC Article 408, Switchboards and Panelboards.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Packing:
   a. Inspect prior to packing to assure that assemblies and components are complete and undamaged.
   b. Protect mating connections.
   c. Cover all openings into enclosures with-vapor inhibiting, water-repellent material.

2. Deliver materials and equipment to Site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in concrete in ample time to prevent delaying the Work. Upon deliver, check materials and equipment for evidence of water that may have entered equipment during transit.

3. Comply with Section 01 65 00, Product Delivery Requirements.

B. Storage and Protection:

1. Store panelboards in a clean, dry location with controls for uniform temperature and humidity. Protect equipment with coverings and maintain environmental controls.

2. Comply with Section 01 66 00, Product Storage and Handling Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Panelboards:

1. Manufacturers: Provide products of one of the following:
   a. ABB (GE).
   b. Eaton/Cutler-Hammer.
   c. Schneider Electric/Square D Company.
   d. Or equal.

2. Rating: Voltage rating, current rating, number of phases, number of wires and number of poles as shown or indicated on the Drawings.

3. Circuit Breakers: Molded case, bolt-in thermal magnetic type with number of poles and trip ratings as shown or indicated. Where indicated on the Drawings, circuit breakers shall be ground fault circuit interrupting type equipped with solid state sensing and five-milliamp sensitivity.

4. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Circuit breakers for 480-volt panelboards shall have minimum interrupting rating of 14,000 ampere RMS symmetrical, unless otherwise indicated on the Drawings. Circuit breakers for other panelboards shall have minimum interrupting rating of 10,000 ampere RMS symmetrical, unless otherwise indicated on the Drawings.

5. Bus Bars: Bus bars shall be 98 percent conductivity copper. Four-wire panelboards shall have solid neutral bar. Each panel shall have ground bus bar.

6. Main: Panelboards shall have main circuit breaker unless the Drawings specifically indicate main lugs only.

7. Connect branch circuit breakers for sequence phasing.

8. Enclosures: Panel enclosures shall be as required for the area classifications indicated in Section 26 05 05, General Provisions for Electrical Systems, unless otherwise indicated on the Drawings.

9. Construction: Code-grade steel, ample gutter space, flush door, flush snap latch and lock. Panelboards shall comply with NEMA PB 1 and UL 67.
   a. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Finish in manufacturer's standard gray enamel. When multiple panels are provided for a single site, provide all panes with the same key configuration. For outside locations, provide panels that allow hasp style lock in either energized or de-energized condition.
   b. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover with flush lock.

10. Trim: Surface or flush as required.

11. Directory: Typed or computer-printed card, with transparent protective cover in frame on back of door giving circuit numbers and area or equipment served.

12. Identification: Identify panelboards in accordance with Section 26 05 53, Identification for Electrical Systems. Identification shall indicate panel number and voltage.

13. Directory of Existing Panelboards: When adding or removing breakers or loads from existing panelboards, provide a new typed or computer-generated directory card, indicating the circuit numbers and equipment served.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Mounting: Install panelboards at locations shown or indicated. Set cabinets so that top branch circuit breaker is not over six feet above the floor.

B. Directory: Complete typewritten or computer-printed directory indicating items controlled by each circuit breaker and the size of feeder serving the panel.

C. Arrange circuits to balance the loads on the panelboards.

D. Identify panelboards in accordance with Section 26 05 53, Identification for Electrical Systems.

E. Install in accordance with Laws and Regulations, manufacturer's recommendations, and the Contract Documents. Verify proper installation prior to energizing panelboards.

END OF SECTION

SECTION 26 27 26.13

LOW-VOLTAGE RECEPTACLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install low-voltage receptacles.

B. Related Sections:

1. Section 26 05 05, General Provisions for Electrical Systems.

2. Section 26 05 53, Identification for Electrical Systems.

3. Section 26 05 37, Boxes.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. UL 498, Standard for Attachment Plugs and Receptacles.

2. UL 514D, Cover Plates for Flush-Mounted Wiring Devices.

3. UL 943, Standard for Ground-Fault Circuit-Interrupters.

4. UL 1010, Standard for Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.

5. UL 1449, Standard for Surge Protective Devices.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. Americans with Disabilities Act.

2. NEC Article 406, Receptacles, Cord Connectors, and Attachment Plugs (Caps).

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data: Manufacturer's technical information for receptacles and cover plates proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Receptacles:

1. Grounding receptacle, two-pole, three-wire, NEMA 5-20R configuration, ivory color. Extra Heavy Duty Industrial grade, with one-piece brass back strap with integral ground. Impact resistant nylon face and back body.
   a. Single:
      1) Products and Manufacturers: Provide one of the following:
         a) HBL5361I by Hubbell, Inc.
         b) 5361AI by Pass & Seymour/Legrand.
         c) Or equal.
   b. Duplex:
      1) Products and Manufacturers: Provide one of the following:
         a) HBL5362I by Hubbell, Inc.
         b) 5362AI by Pass & Seymour/Legrand.
         c) Or equal.
   c. Weather-resistant Duplex:
      1) UL-listed as weather-resistant.
      2) Products and Manufacturers: Provide one of the following:
         a) HBL5362IWR by Hubbell, Inc.
         b) WR5362A-I by Pass & Seymour/Legrand
         c) Or equal.

2. Provide Type 302 stainless steel cover-plate conforming to UL 514D. Provide weatherproof-while-in-use cover where shown on the Drawings as "WP" or "WPU", and provide where receptacles are located in wet or corrosive location.

3. Receptacles shall comply with UL 498.

B. Ground Fault Interrupting Receptacles:

1. Duplex grounding receptacle, two-pole, three-wire, NEMA 5-20R configuration, 125-volt AC, 20 amperes, gray color with ground fault circuit interrupting (GFCI) protection. Extra Heavy Duty Industrial Grade, tamper and weather resistant. Impact resistant nylon face and back body.

2. Continuous self test technology to test and monitor device functionality, and to disconnect power to receptacle if critical components are damaged and GFCI protection lost. With visual indicators to provide status of device.

3. Ground fault interrupting receptacles shall comply with UL 943.

4. Provide Type 302 stainless steel cover-plate conforming to UL 514D. Provide weatherproof-while-in-use cover where shown on the Drawings as "WP" or "WPU", and provide where located in wet or corrosive location.

5. Products and Manufacturers: Provide one of the following:
   a. GF5362SGGY by Hubbell, Inc.
   b. 2097TRWRGRY by Pass & Seymour/Legrand.
   c. Or equal.

C. Weatherproof-While-In-Use Covers:

1. Where receptacles are installed in damp or wet locations as defined in area classification portion of Section 26 05 05, General Provisions for Electrical Systems, provide receptacles as specified in Paragraphs 2.1.A through 2.1.D of this Section, as applicable, with weatherproof-while-in-use covers as specified below.

2. Provide covers that are UL-listed, weatherproof while receptacle is in use, and are of ultraviolet-resistant construction suitable for outdoor use in accordance with NEC 406.

3. Material:
   a. Extra duty non-metallic covers. UV Rated polycarbonate. Corrosion resistant, non-conductive.
   b. Gasketed spring door type for wet and corrosive locations. Corner ball joint hinge for universal mounting capability.
   c. Stainless steel screws and hardware.

4. Products and Manufacturers: Provide one of the following:
   a. Hubbell/TayMac.
   b. Eaton/Crouse-Hinds.
   c. Leviton.
   d. Or equal.
   e. Power and Special Receptacles: Provide receptacles with number of poles and voltage and current rating as shown or indicated. Coordinate with equipment plugs. Provide matching plug for each receptacle.

D. Extension Cord Reel Devices:

1. Ceiling mounted or as shown on Contract Drawings.

2. Positive stop action at any length, ratchet lock and automatic rewind spring.

3. Receptacle: NEMA WD 6 Configuration 5-20R extra heavy-duty grade, and FS W-C-596 or as indicated on Contract Drawings. Molded high impact outlet box with duplex 5-20R GFI extra heavy-duty industrial grade outlet and spring close cover plate.

4. Provide with 50 feet of #12/3 SJEO (minimum) cord.

5. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

6. Manufacturers
   a) HBLI25123GF20Y by Hubbell, Inc.
   b) Or accepted equal.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which the Work is to be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Non-hazardous Locations: Install receptacles at locations shown, in outlet or device boxes in accordance with Section 26 05 33.36, Outlet Boxes.

B. Install receptacles with ground pole in the down position.

C. Mount receptacles 18 inches above finished floor in non-hazardous locations and 4.5 feet above finished floor in hazardous locations, in accordance with the Americans with Disability Act, unless otherwise shown or indicated in the Contract Documents.

D. Install in conformance with Laws and Regulations.

E. Identification:

1. Identify each receptacle with circuit number and lighting panel number in accordance with Section 26 05 53, Identification for Electrical Systems.

2. Identify each receptacle with permanent phenolic tag. Tags shall include circuit number and lighting panel number.

END OF SECTION

SECTION 26 27 26.23

SNAP SWITCHES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install snap switches for lighting and other systems.

B. Related Sections:

1. Section 26 05 53, Identification for Electrical Systems

2. Section 26 05 37, Boxes.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. UL 20, General Use Snap Switches.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements

1. Americans with Disabilities Act

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data: Manufacturer’s technical information for switches proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Switches for Non-Hazardous Locations:

1. Single pole AC toggle switch, quiet type, 120/277-volt AC, 20 amperes, Ivory, extra heavy duty industrial grade. Nickle plated steel mounting strap.
   a. Products and Manufacturers: Provide one of the following:
      1) Catalog No. HBL1221I, by Hubbel, Inc.
      2) Catalog No. AH1221I, by Eaton/Arrow-Hart, Inc.
      3) Catalog No. PS20AC1I, by Pass & Seymour/Legrand
      4) Or equal.

2. Single pole, three-way AC toggle switch, quiet type, 120/277-volt AC, 20 amperes, Ivory, extra heavy duty industrial grade. Nickle plated steel mounting strap.
   a. Products and Manufacturers: Provide one of the following:
      1) Catalog No. HBL1223I, by Hubbell, Inc.
      2) Catalog No. AH1223I, by Eaton/Arrow-Hart, Inc.
      3) Catalog No. PS20AC3I, by Pass & Seymour/Legrand
      4) Or equal.

3. Single pole, four-way AC toggle switch, quiet type, 120/277-volt AC, 20 amperes, Ivory, extra heavy duty industrial grade. Nickle plated steel mounting strap.
   a. Products and Manufacturers: Provide one of the following:
      1) Catalog No. HBL1224I, by Hubbell, Inc.
      2) Catalog No. AH1224I, by Eaton/Arrow-Hart, Inc.
      3) Catalog No. PS20AC4I, by Pass & Seymour/Legrand
      4) Or equal.

4. Two-pole AC toggle switch, quiet type, 120/277-volt AC, 20 amperes, Ivory, extra heavy duty industrial grade. Nickle plated steel mounting strap.
   a. Products and Manufacturers: Provide one of the following:
      1) Catalog No. HBL1222I, by Hubbel, Inc.
      2) Catalog No. AH1222I, by Eaton/Arrow-Hart, Inc.
      3) Catalog No. PS20AC2I, by Pass & Seymour
      4) Or equal.

5. Switches in non-hazardous areas shall be UL-listed in accordance with UL 20.

B. Switch Covers:

1. Indoor covers shall be Type 304 stainless steel.

2. Outdoor, wet, or corrosive location covers shall be weatherproof and corrosion resistant.

C. Key Operated On-Off Switches:

1. Key operated switches shall be complete with legend plate and NEMA 4 enclosure and two keys for each switch.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which the Work is to be installed and notify Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install switches at locations as shown or indicated in the Contract Documents in outlet or device boxes, in accordance with Section 26 05 33.36, Outlet Boxes.

B. Mount wall switches 4.0 feet above finished floor, in accordance with the Americans with Disability Act, unless otherwise noted.

C. Identify each switch with circuit number and lighting panel number. Identification shall be in accordance with Section 26 05 53, Identification for Electrical Systems.

END OF SECTION

SECTION 26 28 16.33

DISCONNECT SWITCHES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install disconnect switches.

B. Related Sections:

1. Section 26 05 05, General Provisions for Electrical Systems.

2. Section 26 05 53, Identification for Electrical Systems.

3. Section 26 27 26.23, Snap Switches.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. UL 98, Enclosed and Dead-Front Switches.

2. NEMA KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

3. NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. NEC Article 404, Switches.

2. Disconnect switches shall bear the UL label.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Listing of each switch to be furnished, including location, rating, and NEMA enclosure type for each.

2. Product Data:
   a. Manufacturer's technical information for disconnect switches proposed for use.

B. Maintenance Material Submittals: Submit the following:

1. Extra Stock Materials:
   a. Furnish one set of spare fuses for each fused disconnect switch to be installed.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Provide products of one of the following:

1. Square-D Company.

2. Cutler-Hammer.

3. General Electric Company.

4. Siemens.

5. Or equal.

2.2 MATERIALS

A. Service Disconnect Switches:

1. Type: Fused, heavy-duty, single throw, quick-make, quick-break mechanism, visible blades in "OFF" position and safety handle.

2. Rating: Voltage, current and short circuit ratings and number of poles as shown or indicated on the Drawings. Switch shall bear UL label indicating suitability for use as service equipment and shall comply with UL 98, NEMA KS 1, and NEMA 250.

3. Provide auxiliary dry contacts to indicate switch position where shown on the Drawings.

B. Single Throw, Circuit Disconnect Switches:

1. Type: Fused or unfused, horsepower rated, heavy-duty, single throw, quick- make, quick-break mechanism, visible blades in the "OFF" position and safety handle.

2. Rating: Voltage and current ratings and number of poles as required for motor or equipment circuits being disconnected. Switches shall bear a UL label and shall comply with the requirements of UL 98, NEMA KS 1 and NEMA 250.

3. Provide auxiliary dry contacts to indicate switch position.

D. Disconnect Switches for 120-volt, Single-phase Circuits:

1. Refer to Section 26 27 26.23, Snap Switches.

E. Enclosures: NEMA rating shall be as required for area classifications specified in Section 26 05 05, General Provisions for Electrical Systems.

F. Identification:

1. Identify enclosures in accordance with Section 26 05 53, Identification for Electrical Systems.

2. Provide nameplate to identify the equipment served by disconnect switch and associated source of power.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine conditions under which the Work will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

B. Securely fasten equipment to walls or other structural supports on which they are mounted. Provide independent stainless steel supports where no wall or other structural surface exists. Mount disconnect enclosures at a height not exceeding six feet.

C. Provide suitable 1/4-inch spacers to prevent mounting enclosure directly against walls.

END OF SECTION

SECTION 26 29 37

LOW-VOLTAGE COMBINATION MAGNETIC MOTOR STARTERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install low-voltage combination magnetic motor starters.

B. Related Sections:

1. Section 26 05 05, General Provisions for Electrical Systems.

2. Section 26 05 53, Identification for Electrical Systems.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. NEMA ICS 2, Controllers, Contactors and Overload Relays Rated 600 Volts.

2. NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Listing of low-voltage combination magnetic motor starters to be furnished, listing for each the installation location, NEMA rating and enclosure size, and equipment to be controlled.
   b. Customized wiring diagrams for low-voltage combination magnetic motor starters.

2. Product Data:
   a. Manufacturer's technical information, specifications, and standardized wiring diagrams for low-voltage combination magnetic motor starters proposed.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Manufacturers: Provide products of one of the following:

1. Schneider Electric/Square D Company.
2. Allen Bradley Company.
3. General Electric Company.
4. Cutler-Hammer.
5. Or equal.

B. Design, fabricate, and test low-voltage combination magnetic motor starters in accordance with NEMA ICS 2 and NEMA 250.

C. General:

1. Type: Combination type with magnetic-only motor circuit protector with interrupting rating of not less than 65,000 ampere RMS symmetrical, unless otherwise indicated on the Drawings. Magnetic coil operated, NEMA horsepower rated, with thermal overload protection. Coil shall be rated 120 vac.
2. Enclosures: Panel enclosures shall be as required for area classifications specified in Section 26 05 05, General Provisions for Electrical Systems, unless otherwise indicated on the Drawings.
3. Functional Type: Full-voltage, single speed, non-reversing, unless otherwise shown or indicated on the Drawings.
4. Control power transformer fused and grounded on low-voltage (120 vac) side for each starter.
5. Auxiliary contacts for motor space heaters, remote status signals, and interlocks as shown or indicated on the Drawings and as required.
6. Overload Relays: Provide an overload relay for each motor starter. Overload relays shall be in accordance with:
   a. Thermal Overload Relays: Relays shall be thermal, bimetallic type, direct or current sensing. Relays shall include ambient compensation and be equipped with separate heater elements sized for full load amperes and service factor of actual motors furnished.
   b. Each overload relay shall be manual-reset type and include provisions for resetting by an insulating button on front of starter unit door.
   c. Overload relay shall include normally open auxiliary contact for remote alarm purposes.

d. Size overload relay for full-load amperes and service factor of actual motors installed.

7. Provide nameplate identifying equipment controlled in accordance with Section 26 05 53, Identification for Electrical Systems.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:

1. Install equipment in accordance with the Contract Documents, Laws and Regulations, and manufacturer's installation instructions.

2. Install equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

3. Securely fasten equipment to walls or other surfaces on which equipment is mounted. Provide suitable 1/4-inch spacers so that enclosure is not installed directly against walls. Provide supports to rigidly support equipment reasonably close to motor where no wall or surface capable of supporting equipment exists.

END OF SECTION

SECTION 26 36 23

TRANSFER SWITCHES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install automatic transfer switches.

2. Switches specified under this Section include enclosed types.

3. Section includes Generator Connection Cabinets.

B. Related Sections:

1. Section 26 05 53, Identification for Electrical Systems.

2. Section 26 32 13, Engin Generators.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. IEEE 472, Guide for Surge Withstand Capability Tests.

2. IEEE 446, Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications.

3. IEEE C62.41, Recommended Practice for Surge Voltages in Low Voltage AC Power Circuits.

4. NEMA ICS1 109, Tests and Procedures.

5. NEMA ICS10, AC Automatic Transfer Switches.

6. NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

7. UL 1008, Transfer Switch Equipment.

8. UL 1008 Supplement SB, Standard Accessories, Transfer Switches.

9. UL 508, Industrial Control Equipment

10. UL 61010B-1 (previously UL 3111-1), Electrical Measuring and Test Equipment; Part 1: General Requirements.

11. ANSI C37.90a, Surge Withstand Capability Test (formerly IEEE Standard 472-1974) – Ring Wave Test.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. NEC Article 700, Emergency Systems.

2. NEC Article 701, Legally Required Standby Systems.

3. NEC Article 702, Optional Standby Systems.

4. The Generator Connection Cabinet shall be UL labeled as a complete assembly.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Listing of Generator Connection Cabinet to be provided, including ratings and location of each.
   b. Equipment dimensions, and construction details of enclosures with conduit entry locations.

2. Product Data:
   a. Manufacturer's technical information for products proposed, including catalog cut sheets.

3. Test Procedures:
   a. At least thirty days prior to actual factory and field testing, submit proposed testing procedures, methods and apparatus.

B. Informational Submittals:

1. Source Quality Control Submittals:
   a. Submit reports of completed factory tests, including test results and procedures used for testing.

2. Field Quality Control Submittals:
   a. Submit reports of completed field tests, including test results and procedures used for testing.

3. Supplier Instructions:
   a. Manufacturer's written instructions for transporting, handling, storing, and installing the products.

4. Supplier Reports:
   a. Written report of each visit to Site by supplier's service representative.

C. Closeout Submittals

1. Operation and Maintenance Data:
   a. Submit complete installation, operation and maintenance manuals including test reports, maintenance data and schedules, description of operation, and spare parts information.
   b. Manuals shall include record drawings of control schematics, including point-to-point wiring diagrams.
   c. Furnish operation and maintenance manuals per Section 01 78 23, Operations and Maintenance Data.

D. Maintenance Material Submittals: Furnish the following:

1. Spare Parts and Extra Stock Materials: Provide as specified in this Section.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver products to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices to be embedded in cast-in-place concrete in time to prevent delay of the Work.

B. Shipping sections shall be designed to be shipped by truck, rail, and ship. Indoor sections shall be bolted to skids.

C. Equipment shall be equipped to be handled by crane. Where cranes are not available equipment shall be suitable for skidding in place on rollers using jacks to raise and lower the sections.

D. Comply with Section 01 65 00, Product Delivery Requirements, and Section 01 66 00, Product Storage and Handling Requirements.

1.6 MAINTENANCE

A. Spare Parts and Extra Stock Materials:

1. Furnish, tag, and box for shipment and long term storage the following spare parts for each switch:

Item	Quantity per Switch
a. Cam Loks	Two of each type used
b. Cam Lok Covers	Two of each type used
c. Cam Lok Connectors	Two of each type used

2. Furnish a list of additional recommended spare parts for an operating period of one year. Describe each part, quantity recommended, and current unit price of each.

3. Package spare parts in suitable containers bearing labels clearly indicating contents and equipment with which they are to be used. Deliver spare parts at same time as switchgear.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Provide automatic transfer switches as specified for transferring loads from one power source to another.

B. Provide Generator Connection Cabinet for temporary generator connection point.

2.2 MANUFACTURERS

A. Manufacturers, Generator Connection Cabinet: Provide products of one of the following:

1. Berthold Electric Company (Basis of Design).

2. Powertron Standard Series 800 Tap Box.

3. Or equal.

2.3 GENERATOR CONNECTION CABINET

A. Ratings:

1. Voltage and Amperes: 480/277 Volts, 800 Amps.

2. Short Circuit Withstand: 100,000AIC

B. Construction:

1. Bus Material: Silver plated copper, supported with UL Recognized Component insulators.

2. Permanent Bus Connection: Long barrel compression lugs, quantity as required for specified conductors.

3. Field (temporary)Wiring Connections: Color coded male 400 ampere Cooper Crouse-Hinds Cam-Loks, one connector per 400 Amps.

C. Enclosure:

1. Wall-Mounted.

2. NEMA 4X Stainless Steel.

3. Lockable latches on Cam-Lok access door.

D. Additional Features:

1. Security cabinet: Cam-Loks mounted internally behind temporary cable pass-through openings to prevent unauthorized cable disconnection while in use.

2. Provide complete set of matching Cam-Lok connectors for connection to temporary generator conductors. Provide with locking storage cabinet for Owner's use.

3. Cam-Lok Snap covers:
   a. Color-coded to match Cam-Loks
   b. Spring activated to close when not connected.
   c. Thermoplastic covers and bodies.

4. Welded construction.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which Work is to be performed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

B. Install equipment in accordance with Contract Documents and manufacturer recommendations.

C. Securely fasten equipment to floors, walls, or other surfaces on which equipment will be mounted. Install freestanding switches on raised concrete pad at locations shown on Drawings. Install in accordance with manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

A. Perform field testing and inspection of each automatic transfer switch. Testing and inspection shall be in accordance with manufacturer's recommendations and be performed by manufacturer's factory-trained representative, who shall inform Owner and Engineer when equipment has been correctly installed. Do not energize equipment without permission of Owner.

3.4 MANUFACTURER SERVICES

A. Manufacturer Services:

1. Unloading and Installation: Manufacturer's factory-trained representative shall be present during unloading of equipment and installation at equipment's final location. In advance of installation, representative shall train installing personnel in proper handling and rigging of equipment, for at least 1 eight-hour days at the Site.

2. Manufacturer's factory-trained representative shall test the system as specified in Article 3.3 of this Section. Representative shall operate and test system in the presence of Engineer and verify that equipment conforms to requirements. These services shall be at least 2 eight-hour days at the Site.

3. Manufacturer's factory-trained representative shall adjust the system to initial settings specified in Article 2.6 of this Section.

4. Representative shall revisit the Site as often as necessary until all deficiencies are corrected, prior to readiness for final payment.

5. Provide services of manufacturer's factory-trained representatives to correct defective Work within 72 hours of notification by Owner during the Correction Period specified in the General Conditions as amended by the Supplementary Conditions.

6. Replacement parts or equipment installed during the Correction Period shall be equal to or better than the original.

B. Training: Furnish services of qualified factory trained specialists from manufacturer to instruct Owner's operations and maintenance personnel in recommended operation and maintenance of the products. Training requirements, duration of instruction, and other qualifications shall be in accordance with Section 01 79 23, Instruction of Operations and Maintenance Personnel.

END OF SECTION

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior luminaires.

B. LED lighting drivers.

C. Emergency LED Drivers.

D. Luminaire accessories.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.0

B. Section 26 05 37 - Boxes.

C. Section 26 09 24 – Lighting Controls.

1.3 REFERENCE STANDARDS

A. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.

B. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).

C. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; Illuminating Engineering Society; 2015.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

E. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.

F. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 101 - Life Safety Code; 2015.

I. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

J. UL 1598 - Luminaires; Current Edition, Including All Revisions.

K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

1. Provide a typed index listing lighting fixture type designation, lighting fixture manufacturer, complete catalog number, quantity of LED drivers to be provided, type lens, modifications, and accessories. Arrange in order of lighting fixture designation.

2. LED Luminaires:
   a. Include estimated useful life, calculated based on IES LM-80 test data.

3. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IESNA LM-63 standard format for proposed substitutions.

4. For LED fixtures, provide fixtures that meet or exceed the tested total luminaire efficiency of the specified fixtures.

5. Include LED emergency drivers, including batteries and chargers.

6. Manufacturer’s verification of LED color consistency, indicating the LED source binning tolerance.

1.5 QUALITY ASSURANCE

A. Lighting Fixture Photometric Data Testing Laboratory Qualifications: Lighting fixture manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. LED Lighting Fixture IES LM-79 Test Report: Submit test report on manufacturer's standard production model luminaire. Include all applicable and required data as outlined under "14.0 Test Report" in IES LM-79.

C. LED Lighting Fixture LM-80 Test Report: Submit report on manufacturer's standard production LED light source (package, array, or module). Include all applicable and required data as outlined under "8.0 Test Report" in IES LM-80.

D. LED Driver and Dimmer Switch Compatibility Certificate: Submit certification from the luminaire, driver, or dimmer switch manufacturer that ensures compatibility and operability between devices.

E. Each lighting fixture type shall have light sources binned within a 3-step MacAdam Ellipse to ensure color consistency among luminaires.

F. Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products must have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year period must include applications of equipment and materials under similar circumstances and of similar size. The product must have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the two-year period. Where two or more items of the same class of equipment are required, these items must be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.6 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of lighting fixtures that fail in materials or workmanship within specified warranty period.

B. Warranty Period: 5 years from date of Substantial Completion, to include materials and fixture finish. Material warranty must include all drivers, and fixture replacement when more than 10 percent of LED sources in any lightbar or subassembly(s) are defective or non-starting.

PART 2 PRODUCTS

2.1 LUMINAIRE AND COMPONENTS, GENERAL REQUIREMENTS

A. Provide lighting fixtures complete with power supplies (drivers) and light sources. Provide design information including lumen output and design life in lighting fixture schedule on project plans for LED luminaires. LED lighting fixtures must meet the following minimum luminaire efficacy (LE): LED Troffers: 90 LPW

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Factory-Applied Labels: Comply with UL 1598. Include recommended light sources. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when light sources are in place. Label shall include the following lamp characteristics: "USE ONLY" and include specific light source type, and CCT and CRI.

D. Recessed lighting fixtures shall comply with NEMA LE 4.

E. California Title 24 compliant.

F. Lighting fixtures must be listed with the DesignLights Consortium 'Qualified Products List' when falling into category of "General Application" luminaires, i.e. Interior Directional, Display Case, Troffer, Linear Ambient, or Low/High Bay. Requirements are shown in the Designlights Consortium "Technical Requirements Table" at https://data.energystar.gov/dataset/EPA-Recognized-Laboratories-ForLighting-Products/jgwf-7qrr.

G. Standards:

1. ENERGY STAR certified.

2. RoHS compliant.

3. Recessed luminaires shall comply with NEMA LE 4.

4. Provide Department of Energy 'Lighting Facts' label for each luminaire.

H. Networked Lighting Fixtures (Addressable, Wired):

1. Networked lighting fixtures shall support individual (unique) configuration of device settings and properties, with such configuration residing within the networked luminaires.

2. Networked lighting fixtures shall have distributed intelligence programming stored in non-volatile memory, such that following any loss of power the lighting control zones shall operate according to their defined default settings and sequence of operations.

3. Networked lighting fixtures located in different areas shall be able to transmit and track information within at least 128 system-wide control zones to support required sequences of operation that may span across multiple areas. Occupancy and photocell commands shall be available across a single controller, and switch commands shall be available across single or multiple controllers. These shall also be referred to as global control zones.

4. Networked lighting fixture shall have a mechanically integrated control device.

5. Networked LED lighting fixture shall have two RJ-45 ports available (via control device directly or incorporated RJ-45 splitter).

6. Networked LED lighting fixture shall be able to digitally network directly to other network control devices (sensors, photocells, switches, dimmers).

7. Networked LED lighting fixture shall provide low voltage power to other networked control devices (excluding EMG and CCT capable versions).

8. Basis of Design: Addressable Networked LED Lighting Fixtures shall be factory enabled with embedded networking capability, based on Acuity Brands nLight controls.

2.2 BASIS OF DESIGN

A. Furnish products as indicated in Lighting Fixture Schedule included on the drawings.

B. Substitutions: See Section 01 60 00 - Product Requirements, except where individual luminaire types are designated with substitutions not permitted. If substitution product and/or Manufacturer is proposed, submittal needs to clearly indicate that lighting fixture is a substitution and must clearly show compliance with being equivalent with Basis of Design product. If exceptions are taken based on nonequivalence than all exceptions must be identified in product submittal.

2.3 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, drivers, reflectors, lenses, housings and other components required to position, energize and protect the light source and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

2.4 LED DRIVERS

A. LED drivers must be electronic, UL Class 1, constant-current type and comply with the following requirements:

1. Output power (watts) and luminous flux (lumens) as shown in Lighting Fixture Schedule for each luminaire type to meet minimum luminaire efficacy (LE) value provided.

2. Power Factor (PF) greater than or equal to 0.9 over the full dimming range when provided.

3. Current draw Total Harmonic Distortion (THD) of less than 20 percent.

4. Class A sound rating.

5. Operable at input voltage of 120-277 volts at 60 hertz.

6. RoHS compliant.

7. Integral thermal protection that reduces or eliminates the output power if case temperature exceeds a value detrimental to the driver.

8. UL listed for dry or damp locations typical of interior installations.

9. Fully-dimmable using 0-10V control as indicated in Lighting Fixture Schedule.

2.5 LED LIGHT SOURCE

A. Correlated Color Temperature (CCT) of 3500 degrees K, unless otherwise indicated in the Lighting Fixture Schedule.

B. Minimum Color Rendering Index (CRI) R9 value of 90, unless otherwise indicated in the Lighting Fixture Schedule.

C. High power, white light output utilizing phosphor conversion (PC) process.

D. RoHS compliant.

E. Provide light source color consistency by utilizing a binning tolerance within a 3-step MacAdam ellipse.

2.6 LIGHTING FIXTURE SUPPORT

A. Comply with requirements in "Hangers and Supports for Electrical Systems" section for channel and angle iron supports and nonmetallic channel and angle supports.

B. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

2.7 EMERGENCY LED DRIVERS

A. Description:

1. Single package that includes high temperature nickel cadmium battery, automatic charger and electronic control circuitry. Unit shall operate the scheduled light source at the specified power output for 90 minutes and then cutout to preserve battery; upon restoration of normal AC power the battery shall automatically fully recharge within 24 hours.

2. Galvanized metal case, compact design for low-profile luminaires.

3. Input shall be dual rated, 120/277 volts, approximately 4 watt normal load.

4. Output voltage shall be 15 – 52 VDC.

5. Package shall be UL listed, per UL924 - Emergency Lighting Equipment.

6. Units for shall operate LED light source, initial minimum output of 10 watts. These units shall include a test switch, an LED charging indicator, and they shall include self-testing circuitry and controls to automatically test the unit for 30 seconds every 28 days and will initiate a 90 minute discharge test once a year; should a problem be detected the indicator light shall flash at 1 to 2 second intervals and an audible alarm shall sound 4 times every 30 seconds.

B. Basis of Design: Bodine BSL310LPST.

C. Installation: Field, or factory installed by luminaire manufacturer; the LED shall be visible without opening luminaire. Contractor shall apply an adhesive 1/4 in. diameter black dot on the luminaire trim to identify the emergency units.

PART 3 EXECUTION

3.1 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of luminaires provided under this section.

B. Install products according to manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Install accessories furnished with each luminaire.

F. Bond products and metal accessories to branch circuit equipment grounding conductor.

3.2 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.

3.3 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.4 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 26 56 19

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior LED lighting fixtures.
2. Lighting fixture supports.
3. Lighting fixture poles.
4. Fixture-mounted photocells and motion sensors.

B. Related Requirements:

1. "Lighting Controls" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Common Work Results for Electrical Systems

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4.

B. Ice Load: Load of 3 lbf/sq. ft. (143.6 Pa), applied as stated in AASHTO LTS-4.

C. Wind Load: Pressure of wind on pole and luminaire, calculated and applied as stated in AASHTO LTS-4.

1. Wind speed for calculating wind load for poles 50 feet (15 m) or less in height is 110 mph (177 km/h).

1.5 SUBMITTALS

A. Organize submittals in bound brochures containing descriptive sheets for each different lighting fixture type.

B. Action Submittals: Submit the following:

1. Product Data: For each type of product:
   a. Provide a typed index listing lighting fixture type designation, lighting fixture manufacturer, complete catalog number, quantity of LED drivers to be provided, type lens, modifications, and accessories. Arrange in order of lighting fixture designation.
   b. Include data on features, accessories, and finishes.
   c. Include data on lighting fixture efficacy (Lumens per Watt).
   d. Include physical lighting fixture description and dimensions of lighting fixture.
   e. Include LED emergency drivers, including batteries and chargers.
   f. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
   g. Manufacturer’s verification of LED color consistency, indicating the LED source binning tolerance.
   h. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides" for each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project.
      1) Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

2. Shop Drawings: For nonstandard or custom lighting fixtures.
   a. Include plans, elevations, sections, and mounting and attachment details.
   b. Include details of lighting fixture assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

c. Include diagrams for power, signal, and control wiring.

C. Maintenance Material Submittals: Submit the following:

1. Operation and Maintenance Data: For lighting fixtures and lighting systems to include in operation and maintenance manuals.

2. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   a. Light sources (LED Boards): Ten for every 100 of each type and rating installed. Furnish at least one of each type.
   b. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
   c. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

D. Product Schedule: For lighting fixtures and light sources. Use same designations and types indicated on Drawings.

1.6 QUALITY ASSURANCE

A. Lighting Fixture Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.

B. LED Lighting Fixture IES LM-79 Test Report: Submit test report on manufacturer's standard production model luminaire. Include all applicable and required data as outlined under "14.0 Test Report" in IES LM-79.

C. LED Lighting Fixture IES LM-80 Test Report: Submit report on manufacturer's standard production LED light source (package, array, or module). Include all applicable and required data as outlined under "8.0 Test Report" in IES LM-80.

D. Provide lighting fixtures from a single manufacturer for each fixture type.

E. Each lighting fixture type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

F. Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products must have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year period must include applications of equipment and materials under similar circumstances and of similar size. The product must have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the two-year period. Where two or more items of the same class of equipment are required, these items must be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

G. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

B. Delivery:

1. Upon delivery, inspect equipment for evidence of water that may have entered equipment during transit.

C. Storage:

1. Store lighting fixtures, controls, related materials and equipment in clean, dry location with controls for uniform temperature and humidity. Protect materials and equipment with coverings and maintain environmental controls.

2. Store materials and equipment for easy access for inspection and identification. Keep materials and equipment off ground, using pallets, platforms, or other supports. Protect materials and equipment from corrosion and deterioration.

1.8 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with lighting fixture installation.

B. Mark locations of exterior lighting fixtures for approval by Architect prior to the start of fixture installation.

1.9 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures, including lighting fixture support components.
   b. Faulty operation of lighting fixtures and accessories.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 5 year(s) from date of Substantial Completion, to include materials and fixture finish. Material warranty must include all drivers, and fixture replacement when more than 10 percent of LED sources in any lightbar or subassembly(s) are defective or non-starting.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Lighting fixtures and light sources shall be labeled vibration and shock resistant.

1. The term "withstand" means "the Lighting fixture will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

B. Ambient Temperature: 5 to 104 deg F (Minus 15 to plus 40 deg C).

1. Relative Humidity: Zero to 95 percent.

C. Altitude: Sea level to 1000 feet (300 m).

2.2 LIGHTING FIXTURE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Lighting fixtures shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. UL Compliance: Comply with UL 1598 and listed for wet locations.

E. L70 LED light source life of 50,000 hours.

F. Light sources dimmable from 100 percent to 0 percent of maximum light output.

G. Internal driver.

H. Lighting fixtures must be listed with the DesignLights Consortium 'Qualified Products List'. Requirements are shown in the DesignLights Consortium "Technical Requirements Table" at https://data.energystar.gov/dataset/EPA-Recognized-Laboratories-ForLighting-Products/jgwf-7qrr.

I. Lighting fixtures shall be Dark Sky compliant.

J. Standards:

1. ENERGY STAR certified.

2. RoHS compliant.

3. Provide Department of Energy 'Lighting Facts' label for each luminaire.

K. Nominal Operating Voltage: Multi-Volt ac.

L. In-line Fusing: Separate in-line fuse for each luminaire.

M. Source Limitations: Obtain lighting fixtures from single source and from a single manufacturer.

2.3 LED DRIVER REQUIREMENTS

A. LED drivers must be electronic, UL Class 1, constant-current type and comply with the following requirements:

1. Output power (watts) and luminous flux (lumens) as shown in Lighting Fixture Schedule for each luminaire type to meet minimum luminaire efficacy (LE) value provided.

2. Power Factor (PF) greater than or equal to 0.9 over the full dimming range when provided.

3. Current draw Total Harmonic Distortion (THD) of less than 20 percent.

4. Class A sound rating.

5. Operable at input voltage of 120-277, 208, 480 volts at 60 hertz.

6. RoHS compliant.

7. Integral thermal protection that reduces or eliminates the output power if case temperature exceeds a value detrimental to the driver.

8. UL listed for wet locations typical of exterior installations.

9. Fully-dimmable using 0-10V control as indicated in Lighting Fixture Schedule.

2.4 LED LIGHT SOURCE REQUIREMENTS

A. Correlated Color Temperature (CCT) of 3500 degrees K, unless otherwise indicated in the Luminaire Schedule.

B. Minimum Color Rendering Index (CRI) R9 value of 70 minimum, unless otherwise indicated in the Lighting Fixture Schedule.

C. High power, white light output utilizing phosphor conversion (PC) process.

D. RoHS compliant.

E. Provide light source color consistency by utilizing a binning tolerance within a 3-step MacAdam ellipse.

2.5 LUMINAIRE-MOUNTED PHOTOCELL

A. Comply with UL 773 or UL 773A.

B. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc (16 to 32 lx) and off at 4.5 to 10 fc (48 to 108 lx) with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.

C. Relay with locking-type receptacle shall comply with ANSI C136.10.

D. Adjustable window slide for adjusting on-off set points.

E. May be combined with integral motion sensor, as indicated in the Lighting Fixture Schedule.

2.6 BASIS OF DESIGN

A. Provide lighting fixtures indicated as Basis of Design for each luminaire type.

B. If substitution product and/or Manufacturer is proposed, submittal needs to clearly indicate that lighting fixture is a substitution and must clearly show compliance with being equivalent with Basis of Design product. If exceptions are taken based on nonequivalence than all exceptions must be identified in product submittal.

C. Refer to Lighting Fixture Schedule on the Drawings for specific fixture types.

2.7 GENERAL LIGHTING FIXTURE TYPES

A. Refer to Lighting Fixture Schedule for specific lighting fixture types.

B. Area and Site:

1. Luminaire Shape: Rectangular.

2. Mounting: Pole and Building with extruded-aluminum rectangular arm.

3. Luminaire-Mounting Height: As indicated on the Drawings and in the Lighting Fixture Schedule.

4. Distribution: As indicated on the Drawings and in the Lighting Fixture Schedule.

5. Diffusers and Globes: As indicated on the Drawings and in the Lighting Fixture Schedule.

6. Housings:
   a. Extruded-aluminum housing and heat sink.
   b. Black powder-coat finish.

2.8 MATERIALS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Corrosion-resistant aluminum. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit LED replacement without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during LED replacement and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

D. Diffusers and Globes:

1. Glass: Annealed crystal glass unless otherwise indicated.

2. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.

2. Specular Surfaces: 83 percent.

3. Diffusing Specular Surfaces: 75 percent.

G. Housings:

1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.

2. Provide filter/breather for enclosed light fixtures.

H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following light source characteristics:
   a. "USE ONLY" and include specific lamp type.
   b. CCT and CRI for all luminaires.

2.9 FINISHES

A. Factory-Applied Finish for Aluminum Lighting Fixtures: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
   a. Color: Dark bronze or Black as indicated in the Lighting Fixture Schedule.

2.10 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with requirements in "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

2.11 GENERAL REQUIREMENTS FOR SUPPORT COMPONENTS

A. Lighting Fixture Attachment Provisions: Comply with fixture manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

B. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Shall not cause galvanic action at contact points.

2.12 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with requirements in "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

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 luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.

C. Examine walls for suitable conditions where luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Fasten lighting fixtures to structural support.

D. Supports:

1. Sized and rated for lighting fixture weight.

2. Able to maintain lighting fixture position after cleaning and LED replacement.

3. Support lighting fixtures without causing deflection of finished surface.

4. Lighting fixture-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Wall-Mounted Lighting Fixture Support:

1. Attached to structural members in walls.

F. Wiring Method: Install cables in raceways. Conceal raceways and cables.

G. Install lighting fixtures level, plumb, and square with finished grade unless otherwise indicated.

H. Coordinate layout and installation of lighting fixtures with other construction.

I. Adjust lighting fixtures that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

J. Comply with requirements in "Low-Voltage Electrical Power Conductors and Cables" and "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.4 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Inspect each installed lighting fixtures for damage. Replace damaged fixtures and components.

B. Perform the following tests and inspections[with the assistance of a factory-authorized service representative]:

1. Operational Test: After installing lighting fixtures, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

2. Verify operation of photoelectric and motion sensing controls.

C. Illumination Tests:

1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):
   a. IES LM-5.
   b. IES LM-72.

2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

D. Lighting fixture will be considered defective if it does not pass tests and inspections.

E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting fixtures and photocell/motion sensor.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all lighting fixtures. Replace lamps or luminaires that are defective.

2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3. Adjust the aim of lighting fixtures in the presence of the Architect.

END OF SECTION

DIVISION 27 – NOT USED

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

SECTION 28 15 00

INTEGRATED ACCESS CONTROL HARDWARE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes access control door hardware for the following:

1. Swinging doors.

2. Other doors to the extent indicated.

B. Section includes, but is not necessarily limited to, the following for the integrated access control security and site management system:

1. Electrified and Integrated Access Control Card Key Door Hardware

C. Related Sections include the following:

1. Division 08 Section “Door Hardware Schedule”.

2. Division 08 Section “Fiberglass Doors”,

3. Division 08 Section "Aluminum-Framed Entrances and Storefronts".

4. Division 08 Section "Door Hardware".

5. Division 26 Section "Electrical" for connections to electrical power system and for low-voltage wiring work.

6. Division 27 Section "Communications" for connections to the LAN.

7. Division 28 Section "Access Control" for access control devices and equipment installed at door openings and provided as part of a security and site management system.

8. Division 28 Section "Intrusion Detection" for detection devices installed at door openings and provided as part of an intrusion detection system.

9. Division 28 Section "Video Surveillance" for motion detection and video camera devices and equipment installed at door openings and provided as part of a security and site management system.

10. Division 28 Section "Fire Detection and Alarm" for connections to building fire alarm system.

D. References:

1. ANSI A117.1 (1998) - Accessible and Usable Buildings and Facilities.

2. IBC - International Building Code

3. NFPA 70 (2002) - National Electrical Code.

4. NFPA 80 (1999) - Fire Doors and Windows.

5. NFPA 101 (2006) - Life Safety Code.

6. UL 294 - Access Control Systems.

7. UL 1076 - Proprietary Burglar Alarm Units and Systems.

E. Products installed, but not provided under this Section include the following. Coordination to remain a requirement of this Section.

1. Security or High Security keyed cylinders, including provisions for temporary construction keying, for mechanical override at access control locking hardware to be furnished under Division 8 Section "Door Hardware".

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. System Operational Descriptions: Complete system operational narratives for the integrated access-controlled openings defining the owner's prescribed requirements for the opening functionality. Narratives include, but are not limited to, the following situations: normal secured/unsecured state of door; authorized access; authorized egress; unauthorized access; unauthorized egress; fire alarm and loss of power conditions, and interfaces with other building control systems.

C. Shop Drawings: Details of electrified integrated locking hardware and access control firmware, indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication and control of the access control system electrified hardware and firmware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access-controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
b. Complete (risers, point-to-point) access control system block wiring diagrams.

2. Electrical Coordination: Coordinate with related Electrical Sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Proof of Certification: Upon request provide a copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified and authorized provider of the primary access control components.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete access control and site management installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and telephone number of the supplier/integrator providing the installation and the nearest service representatives for each item of equipment included in the system. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

1. As-Built Drawings: During system installation, the Contractor to maintain a separate hard copy set of drawings, elevation diagrams, and wiring diagrams of the access control system to be used for record drawings. This set to be kept up to date by the Contractor with all changes and additions to the access control system accurately recorded.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum of five (5) years of documented experience in providing access control and security systems equipment and software similar to that indicated for this Project and that have a proven record of successful in-service performance.

1. Software and access control systems components to have been previously and thoroughly tested together with proven installations similar in size and functionality to the design requirements indicated for this Project.

B. System Integrator Qualifications: Systems Integrators, verifiably factory trained and certified by the primary product manufacturers, with a minimum of three (3) years documented experience installing complete integrated access control systems similar in material, design, and scope to that indicated for this Project and whose work has resulted in construction with a proven record of successful in-service performance. Qualifications include, but are not necessarily limited, to the following:

1. References: Provide a list of references for similar projects including contact name, phone number, name and type of project.

2. Professional Staffing: Firms to have a dedicated access control systems integration department with full time, experienced professionals on staff experienced in providing on site consulting services for both electrified door hardware and integrated access control systems installations.

3. Factory Training: Installation and service technicians are to be competent factory trained and certified personnel capable of maintaining the system.

4. Service Center: Firms to have a service center capable of providing training, in-stock parts, and emergency maintenance and repairs at the Project site with 24-hour/7-days a week maximum response time.

C. Installer Qualifications: Certified technicians, verifiably authorized with the primary product manufacturers for installation of IP-Enabled, Wireless, and Power-over-Ethernet Access Control products in accordance with documented instructions and NFPA 80.

1. ASSA ABLOY access control products are required to be installed only through designated "Preferred Installers."

D. Source Limitations: Obtain the access control door hardware, system firmware and application software specified in this Section from a single source, qualified supplier/integrator unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide integrated access control door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:

1. Comply with NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1.

3. Comply with NFPA 101 "Life Safety Code" for doors in a means of egress.

4. Comply with NFPA 80 "Fire Doors and Windows" for fire labeled opening assemblies.

5. The installed access control system shall conform to all local jurisdiction requirements.

F. Keying Conference: Reference Division 8 Section "Door Hardware".

G. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier/Dealer, Systems Integrator, and Contractor to review proper methods and procedures for receiving, handling, and installing the access control system hardware. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedules.

1. Inspect and discuss Division 26 electrical roughing-in and similar preparatory work performed by other trades.

2. Review and verify sequence of operation descriptions for each unique access controlled opening.

3. Review and finalize construction schedule and verify availability of materials.

4. Review the required inspecting, testing, commissioning, and demonstration procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store electronic access control hardware, software or related accessories at Project site without prior authorization.

1. Access control firmware and software: Where approved and directed, inventory upon receipt and store electronic access control equipment in a secure, temperature and humidity controlled environment in original manufacturer's sealed containers.

B. Tag each item or package separately with identification related to the final Access Control Door Schedule, and include basic installation instructions with each item or package.

C. Deliver permanent keys, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner established at the “Pre-Submittal Conference".

1.6 COORDINATION

A. Coordinate quantity and arrangement of assemblies with ceiling space configuration and with components occupying ceiling space, including structural members, pipes, air-distribution components, raceways, cable trays, recessed lighting fixtures, and other items.

B. Access Control System Electrical Coordination: Coordinate the layout and installation of scheduled electrified door hardware, and related access control equipment, with required connections to source power junction boxes, power supplies, detection and monitoring hardware and fire alarm system.

1. Door Hardware Interface: The card key access control system to interface and be connected to electronic door control hardware (electromechanical locks, electric strikes, magnetic locks, door position switches, other monitoring contacts, and related auxiliary control devices) as described under Division 8 "Door Hardware". Coordinate the installation and configuration of specified door hardware being monitored or controlled with the controls, software and access control hardware specified in this Section.

C. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing electrified door hardware and access control system components. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing access control system hardware to comply with indicated requirements.

D. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article will not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and are in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of the installed access control system hardware and software that fails in materials or workmanship, including all related parts and labor, within specified warranty period after final testing and acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.

2. Faulty operation of the hardware.

3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods (Electrified Access Control Door Hardware):

1. Two years for Electrified, Wiegand Output, and IP-Enabled Access Control Door Hardware.

E. Maintenance Support and Extended Service Agreement: Submit for Owner’s consideration an optional extended Service Agreement for the installed access control system, including support for software related issues. The extended Service Agreement is considered elective and is without manufacturer's requirement stipulating mandatory coverage for owner and/or vendor system support.

1. A published copy of this agreement to be included with the submittal package

2. Support for the installed access control system components is provided through the vendor under a 24 hour technical assistance program.

3. Access control and management system components are to be available on a one-day turn around time frame from the manufacturer.

4. Primary systems manufacturer to offer and provide remote modem or internet access for direct factory support to the vendor. The factory level support to include diagnostics and troubleshooting support on systems related issues at no additional cost to the owner.

F. Access Control Software Upgrades: Version upgrades and "fix" releases to the access control system software are available at no extra charge as long as the version of software provided under this specification remains the current manufacturer's version or for up to (2) years after a new version release.

1. Major access control software revisions that provide new functionality to the product provided free of charge for up to one (1) year from the date of substantial completion.

2. Access control system software is to be upgradable as may be required or as necessary, to expand and manage the owner's site or sites. Upgrades are to be offered at a published flat fee for the primary system software, with single license modules included in the primary fee structure. System upgrades offered at a costing structure based upon the original number of licensed modules issued, or on those to be purchased at a future date, are not allowed.

3. As part of the submittal package, provide a list of available software upgrades and/or expansions modules. List to identify related costs for upgrades, or expansions to the original system, up to the next qualifying operational level.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of the installed access control system hardware and components.

B. Maintenance Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance by skilled employees of the Systems Integrator. Include repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Integrated Wired Output Multi-Class Exit Hardware: Wiegand output ANSI 156.3 Grade 1 rim, mortise, and vertical rod exit device hardware with integrated card reader with or without keypad option, latchbolt and touchbar monitoring, and request-to-exit signaling, in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle exit trim with 3/4" throw latch bolt. U.L listed and labeled for either panic or "fire exit hardware" for use on up to 3 hour fire rated openings. Available with or without keyed high security cylinder override.

1. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand or OSDP compatible access control systems. Inside push bar (request-to-exit) signaling and door position (open/closed status) monitoring (via separately connected DPS).

2. Integrated reader supports the following credentials:
   a. 125kHz proximity credentials: HID, AWID, Indala, and EM4102.
   b. 13.56 MHz proximity credentials: HID Secure Identity Object™ (SIO) on iCLASS Seos, HID iCLASS, HID iCLASS SE/SR, MIFARE Classic, DESFire EV1 and EV2.
   c. 2.4 GHz credentials: Secure Identity Object™ (SIO) on Mobile IDs (Bluetooth Smart)
   d. ISO14443A/B (PIV-compatible Transparent FASC-N read) available with pivCLASS variant
   e. NFC-enabled mobile phones
   f. PIN code only or PIN + credential with keypad option

3. 12VDC external power supply required for reader. 24VDC required for solenoid operated exit trim. Fail safe or fail secure options.

4. Installation requires only one cable run from the exit hardware to the access control panel without requirements for additional proprietary lock panel interface boards or modules.

5. Competitor Alternates Allowed Option: Installation to include manufacturer's access control panel interface board or module where required for Wiegand or OSDP output protocol.

6. Manufacturers:
   a. Sargent Manufacturing (SA) - SN200/SN210 PE80 Series.
   b. No Substitution.

2.2 CABLES AND WIRING

A. Comply with Division 27 Section "Conductors and Cables for Electronic Safety and Security."

B. Data Line Supervision: System to include alarm initiation capability in response to opening, closing, shorting, or grounding of data transmission lines.

C. Install appropriate number of conductor pairs, in the wire gage (AWG) recommended by manufacturer, corresponding to the electronic locking functions specified, amperage drawn and distances covered between the power supplies, power transfer devices, electrified hardware and access control equipment.

2.3 ACCESS CONTROL HARDWARE FINISHES

A. Standard: Comply with BHMA A156.18.

B. Protect mechanical finishes on exposed surfaces from damage by applying temporary protective coverings before shipping.

C. Where specified, finishes on integrated card key locksets or exit hardware to incorporate an FDA recognized antimicrobial coating (i.e., MicroShield™) listed for use on equipment as a suppressant to the growth and spread of a broad range of bacteria, algae, fungus, mold and mildew.

D. BHMA Designations: Comply with base material and finish as specified.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance of the installed access control system.

B. Examine roughing-in for electrical source power to verify actual locations of wiring connections before electrified and integrated access control door hardware installation.

C. Examine roughing-in for LAN and control cable conduit systems to PCs, controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

D. Notify architect of any discrepancies or conflicts between the specifications, drawings and scheduled access controlled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Doors and frames at scheduled access controlled openings to be properly prepared to receive specified electrified and access control hardware and connections without additional in-field modifications.

3.3 INSTALLATION

A. Install each item of electronic integrated door hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

B. Mounting Heights: Mount electronic integrated door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."

C. Boxed Power Supplies: Verify locations.

1. Configuration: Provide the least number of power supplies required to adequately serve doors with access control hardware and equipment.

D. Final connect the system control switches (integrated card key locking hardware, remote readers, keypads, display terminals, biometrics), and monitoring, and signaling equipment to the related Controller devices at each opening to properly operate the electrified door and access control hardware according to system operational narratives.

E. Retrofitting: Install each door hardware and access control item to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

F. System Application Software: Install, and test application(s) software and databases for the complete and proper operation of systems involved. Assign software license(s) to Owner.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

B. Commissioning and Testing Schedule: Prior to final acceptance of the access control system installation, the following testing and documentation to be performed and provided to the Owner.

1. Inspection: Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.

2. Pre-testing: Program and adjust the system and pretest all components, wiring, and functions to verify they conform to specified requirements. Provide testing reports indicating devices tested, pass/fail status, and actions taken to resolve problem(s) on failed tests.

3. Acceptance Test Schedule: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

4. Provide “as designed” drawings showing each device and wiring connection and electronic enclosure legends indicating cabling in and out.

5. Provide a complete set of operating instructions for access control hardware devices and a complete software user manual. The documentation includes module reference guides for each electronic enclosure.

3.5 ADJUSTING

A. Adjust and check each operating item of integrated access control door hardware, and each door opening to ensure proper secured operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by access control system installation.

B. Clean operating items as necessary to restore proper finish and provide final protection and maintain conditions that ensure access control door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Engage an authorized systems manufacturer representative to train Owner's maintenance personnel to adjust, operate, and maintain electronic integrated door hardware and the access control system.

3.8 ACCESS CONTROL HARDWARE SETS

A. The access control system hardware sets listed below represent the design intent and direction of the owner, architect, and security consultant (as applicable). They are intended as a guideline only and should not be considered a detailed opening schedule. Discrepancies, conflicting, and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Refer to Section 080671, Door Hardware Sets, for hardware sets.

END OF SECTION

SECTION 28 42 00

GAS DETECTION AND ALARM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate, test, adjust and place into satisfactory operation all primary sensors and field instruments shown and specified herein.

2. Contract Documents illustrate and specify functional and general construction requirements of the sensors and field instruments and do not necessarily show or specify all components, wiring, piping and accessories required to make a completely integrated system. Contractor shall provide all components, piping, wiring, accessories and labor required for a complete, workable, and integrated system.

3. Contractor shall be responsible for installing in-line flow elements (magnetic flow meter flow tubes, insert flow tubes, propeller flow meters) and for providing taps in the process piping systems for installation of other flow, pressure, and temperature sensing instrumentation.

B. Coordination: Coordinate with other suppliers for installation of all items specified herein and required to ensure the complete and proper interfacing of all components and systems.

C. Related Sections:

1. Section 26 01 0, General Requirements for Electrical Contract.

2. Section 28 46 20, Addressable Fire-Alarm Systems.

1.2 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

D. Acceptable Manufacturers:

1. Furnish equipment and accessories by the named manufacturers or equal equipment by other manufacturers.

2. The named manufacturers have been specified to establish the standard of quality and performance of the equipment to be supplied.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

B. Protect from damage due to weather, excessive temperature, and construction operations.

1.4 SUBMITTALS

A. Refer to Division 01 for general requirements. All products specified in an individual Division 28 section shall be submitted at the same time. Number each submittal. Indicate deviations from contract requirements on Letter of Transmittal. Corrections or comments made on the Shop Drawings during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Macurco Inc.

1. Substitutions:
   a. RKI
   b. MSA

2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 COMMERCIAL SERIES GAS DETECTORS

A. Features:

1. Certifications: ETL Listed. See detector manual for additional certifications.

2. Size: 4-1/2 x 4 x 2-1/8 inch (114 X 102 X 54 cm). Weight: 1 pound (0.45 kg).

3. Mounting: 4 x 4 inch (101 x 101 mm) electrical box.

4. User selectable settings with default to industry standards via two button interface.

5. LED Display: Can turn on/off. Easily shows gas concentrations.

6. End of life notification.

7. Fan Relay: 5 Amp SPDT.

8. Alarm Relay: 0.5 Amp. Control fans, valves, louvers, horn and strobes.

9. Outputs: 4 to 20 mA. Controls VFDs and to send to BMS. User adjustable settings.

10. Operating Temperature: 0 to 125 degrees F (minus 18 to 52 degrees C) unless otherwise specified.

11. Ambient Humidity: 10 to 90 percent RH Noncondensing.

12. Current Loop: Analog 4 to 20 mA, Digital with MRS-485 Adapter Digital Modbus.

13. Housing Color: Grey.

14. Housing Color: White.

15. Warranty Two Year Limited Warranty.

16. Accessories:
    a. Control Panel: DVP-120B.
    b. Addressable Adapter MRS-485.
    c. Horn and Strobe: HS-A. Color: Amber.
    d. Strobe: MSG-A. Color: Amber.
    e. Horn Only: MHG. Gray Housing.
    f. Duct Mount Kit: DMK-1.
    g. Field Calibration Kits: Based on gas type.
    h. Weatherproof Housing Kit: WHK-1.
    i. Power Supply:
    j. Model PS-24. Standalone plug in 24 VDC transformer.
        1) Size: 2.8 x 1.3 x 1.9 inches (71 x 33 x 48 mm).

2) Input: 90 to 264 VAC.
3) Output Voltage: 24 VDC. Output Current: 1.05 Amps.
4) Operating Temperature: Minus 4 to 104 degrees F (Minus 20 to 40 degrees C).

B. Gas Type: Nitrogen Dioxide. Model: CX-12-NO2.

1. Nitrogen Dioxide Range: 0-20 ppm.

2. Nitrogen Dioxide Low Level Alarm; Adjustable: 0, 0.5, 0.7, 1.0, 1.2, 1.5, 1.7, 2.0, 2.2, 2.5 (default), 2.7, 3.0, 3.2, 3.5, 3.7, 4.0, 4.2, 4.5, 4.7, 5.0 ppm.

3. Nitrogen Dioxide High Level Alarm; Adjustable: 0 to 20 ppm; (5 ppm default).

4. Expected Life of Replaceable Sensor: 5 years.

5. Recommended Coverage Area: 7500 sq ft (697 sq m).

6. Voltage and Current: 12-Series.
   a. Power: 100 to 240 VAC (50 to 60 Hz).
   b. Current: 1.0 A maximum.
   c. Certification: Complies to UL2075, LADBS Approved

2.3 DETECTION VENTILATION CONTROL PANELS

A. Model: DVP-120B. BACnet - 99 Digital Connections. BACnet MSTP output.

1. Certifications:
   a. ETL Listed to UL 2017.
   a. CAN/CSA-C22.2 No.
   b. 14-13, LADBS Approved.

2. Size: 10.5 x 12.5 x 2 inches (267 X 318 X 51 mm). Weight: 6.5 lbs (2.9 kg).

3. Compatible with Macurco 6-Series.

4. Auto recognizes Macurco detectors.

5. Voltage Current: Power Input: 90 to 250 VAC, 1 Amp, 47 to 63 Hz, single phase.

6. Operating Temperature: 32 to 120 degrees F (0 to 49 degrees C).

7. Two Drivers for Horns and Strobes: 24 VDC.

8. Ambient Humidity: 0 to 90 percent RH non-condensing.

9. Settings: Customizable, default is per OSHA.

10. LCD Display: 2 rows of 16 characters with backlight.

11. Settings: External keypad for user selection of transducer and alarm display and setting the configuration.

12. Relays: Three 10 Amp, 240 VAC SPDT fan and alarm.

13. Status Indicators: (LED): Power, Alarm and warning, hush, Relay 1, 2, and 3.

14. Alarms: Drivers for external Horn and Strobe, externally visible system, alarm and relay status indicators.

15. Enclosure: Lockable NEMA 1 type enclosure.

16. Mounting: Mounting holes in each corner.

17. Warranty: Two-year limited warranty.

18. Accessories:
    a. Model MRS-485. Addressable Adapter; 6 series only.
    b. Horn and Strobe: Model HS-A. Color: Amber.
    c. Power Supply: Model MAC10AMP-4. Application: System.
        1) Size: 15.5 x 12 x 4.5 inches (394 x 305 x 114 mm).
        2) Input: 115 VAC.
        3) Output Voltage: 24 VDC. Output Current: 10 A.
        4) Operating Temperature: 32 to 120 degrees F (0 to 49 degrees C).
        5) Number of Outputs: 4.

2.4 REMOTE RELAY

A. Model RD-24: Remote Device box allowing flexibility in the field.

1. Modbus addressable relays, analog outputs, analog inputs.

2. Compatible with Macurco DVP-1200 Control Panel.

3. Enclosure: Wall mount NEMA 4X.

4. Four expansion slots for expansion boards: up to 8 relays, up to 8 analog outputs, or up to 12 analog inputs or a combination of the three

5. Dry Contact Relays: (up to 8 per device), 10 Amp, 250 VAC SPDT

6. Expansion Analog Input: 4 Analog Inputs - max current draw 300mA

7. Expansion Analog Output: 2 Analog Outputs - max current draw 70mA

8. Input: 24 VDC, 0.5 Amp.

9. Status Indicators (LED): Power, communication, Slots 1-4

10. Size: 10.26” x 11.06” x 3.16” (26.06 x 28.09 x 8.03 cm)

11. Input: 24 VDC, 0.5 Amp.

12. Operating Temperature: 32 to 125 degrees F (0 to 52 degrees C).

2.5 ANALOG TO DIGITAL CONVERTER

A. Basis of Design: MRS-485 Modbus RS-485 Addressable Adapter as manufactured by Macurco. Mounting screw and screwdriver included.

1. Operates in the RTU Modbus transmission mode.

2. Interfaces the detector power and 4 to 20 mA output lines with a mounted connector.

3. Monitors sensor type, gas level and trouble status communications from any Macurco 6-Series detector.

4. Communication: On a Modbus serial line.

5. Enclosure: Commercial type to protect and support the electronics.

6. Tricolor LED: Indicates power, test and communication status.

7. Power and Current with Detector: 3.25 Watts maximum from 12 to 24 VAC or VDC, 8 5 mA alarm, 60 mA fan relay on and 33 mA stand by at 24 VDC.

8. Size: 3-1/2 x 2 x 1-3/4 in. (89 X 51 X 44 mm).

9. Operating Environment: 0 to 125 degrees F (minus 18 to 52 degrees C), 10 to 90 percent RH non-condensing.

10. Connections: Plugs and terminals.

11. Baud Rate: 4800, 9600, 19200; default, 38400, 57600, 115200 bps.

12. Connection:
    a. Output: Four terminal screw type connectors.
    b. Wired in standard 2 W Modbus circuits definition with selectable built-in terminating resistors at the ends of the RS-485 bus.
    c. Power for MRS-485 Adapter: Two terminal screw type connector; 12 to 24 VAC or 12 to 24 VDC and no polarity.
        1) Modbus Cable Run: Not to be adjacent to or in same conduit with high voltage wires.

2.6 HORNS AND STROBES

A. Model HS-Series, Horn and Strobe as manufactured by Macurco. Flexible optic design to meet or exceed the light output on vertical/horizontal dispersion.

1. Strobe Candela: Adjustable at 15, 30, 75 or 110 cd; based on test result with clear lens cover.

2. Adjustable Two Audible Tone Settings; (high/low) and Temporal four; (high/low).

3. Size: 5-1/2 x 4-3/4 x 2 inches (140 x 121 x 51 mm).

4. Pulse Duration: 20 milliseconds.

5. Low current draw.

6. High power amber LED.

7. Strobe Flash Rate: 1 flash per second.

8. Nominal Voltage: Regulated 24 VDC.

9. Operating Voltage: 16 to 33 VDC.

10. Operating Environment: 32 to 120 degrees F (0 to 49 degrees C). 10 to 93 percent RH.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly constructed and prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

B. Provide signal to Fire Alarm Control Panel for reporting alarm conditions to Owner’s Monitoring Company.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.5 CLEANING AND PROTECTION

A. Clean products in accordance with the manufacturer’s recommendations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 28 46 20

ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes modifications and additions to existing systems.

B. The buildings currently have Siemens Cerberus fire alarm systems. The Service company is Fire Alarm Service Technology, Inc., (607) 733-0404.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 SUMMARY

A. Section Includes but is not limited to:

1. Complete working fire and life safety alarm system.

2. All items indicated in this specification.

3. New items as indicated on the drawings.

4. Reuse of items as indicated on the drawings.

1.4 DEFINITIONS

A. EMT: Electrical Metallic Tubing.

B. FACP: Fire Alarm Control Panel.

C. HLI: High Level Interface.

D. NICET: National Institute for Certification in Engineering Technologies.

E. PC: Personal computer.

F. VESDA: Very Early Smoke-Detection Apparatus.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.

2. Include rated capacities, operating characteristics, and electrical characteristics.

B. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.

2. Include plans, elevations, sections, details, and attachments to other work.

3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.

4. Riser Wiring Diagram showing all equipment devices, device addresses, connections, control connections, remote notification connections and wire quantities and sizes.

5. Detail assembly and support requirements.

6. Include voltage drop calculations for notification-appliance circuits.

7. Include battery-size and power supply calculations.

8. Include input/output matrix.

9. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.

10. Include performance parameters and installation details for each detector.

11. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.

12. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.

13. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Locate detectors according to manufacturer's written recommendations.
    c. Show field wiring required for HVAC unit shutdown on alarm.
    d. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' control system.

14. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.

15. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams. Clearly indicated Notification and Signaling Zones if present.

C. General Submittal Requirements:

1. Make submittals to Engineer prior to any submittal to Authority Having Jurisdiction.

2. If a Fire Alarm Construction Permit is required prior to the start of work described in this section, the permit shall be applied for and obtained after review and approved comments by the Engineer.

3. Shop Drawings shall be prepared by persons with the following qualifications:
    a. Trained and certified by manufacturer in fire-alarm system design.
    b. NICET-certified, fire-alarm technician; Level IV minimum.
    c. Licensed or certified by authorities having jurisdiction.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Seismic Qualification Data: Certificates, for fire-alarm control unit, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified include the following and deliver copies to authorities having jurisdiction:
   a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
   b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
   c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
   d. Riser diagram.
   e. Device addresses.
   f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
   g. Record copy of site-specific software.
   h. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
      1) Equipment tested.
      2) Frequency of testing of installed components.
      3) Frequency of inspection of installed components.
      4) Requirements and recommendations related to results of maintenance.
      5) Manufacturer's user training manuals.
   i. Manufacturer's required maintenance related to system warranty requirements.
   j. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating manuals.

2. Device address list.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.

2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.

3. Smoke Detectors, Fire Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.

4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.

5. Keys and Tools: One extra set for access to locked or tamperproofed components.

6. Audible and Visual Notification Appliances: One of each type installed.

7. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III or Level IV technician.

C. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.10 PROJECT CONDITIONS

A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.

B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to any facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard (“fire watch”) service during interruptions according to requirements indicated:

1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of fire-alarm service.

2. Do not proceed with interruption of fire-alarm service without Construction Manager's written permission.

3. For systems connected to a Central Monitoring Station, provide required jumpers and bypass connections and/or programming to insure remaining systems will remain functional. Verify temporary work required with Construction Manager prior to installing devices, bypass connections or jumpers and/or making programming changes.

4. All temporary work must be tested to the satisfaction of the Construction Manager and, if required, the local Authority Having Jurisdiction (AHJ).

C. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

D. For systems connected to a Central Monitoring Station, provide required jumpers and bypass connections and/or programming to insure remaining systems will remain functional.

1.11 SEQUENCING AND SCHEDULING

A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

1.12 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.

1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.

2. Warranty Period: Five years minimum from date of Substantial Completion or Final Acceptance.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.

B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and voice/strobe evacuation.

C. Automatic sensitivity control of certain smoke detectors.

D. All components provided shall be listed for use with the selected system.

E. 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 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Duct smoke detectors.
5. Carbon monoxide detectors.
6. Automatic sprinkler system water flow.
7. Fire-extinguishing system operation.
8. Fire standpipe system.

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances, including voice evacuation notices.
2. Identify alarm and specific initiating device at fire-alarm control unit.
3. Transmit an alarm signal to the remote alarm receiving station.

4. Release fire and smoke doors held open by magnetic door holders.

5. Activate voice/alarm communication system.

6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.

7. Activate emergency shutoffs for gas and fuel supplies.

8. Record events in the system memory.

9. Record events by the system printer.

10. Indicate device in alarm on the annunciator.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.

2. Carbon Monoxide or Nitrogen Dioxide detection (see Zones below).

3. Independent fire-detection and -suppression systems.

4. User disabling of zones or individual devices.

5. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.

2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.

3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.

4. Loss of primary power at fire-alarm control unit.

5. Ground or a single break in internal circuits of fire-alarm control unit.

6. Abnormal ac voltage at fire-alarm control unit.

7. Break in standby battery circuitry.

8. Failure of battery charging.

9. Abnormal position of any switch at fire-alarm control unit or annunciator.

10. Voice signal amplifier failure.

11. Hose cabinet door open.

E. System Supervisory Signal Actions:

1. Initiate notification appliances.

2. Identify specific device initiating the event at fire-alarm control unit.

3. Record the event on system printer.

4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.

5. Transmit system status to building management system.

6. Display system status on annunciator.

2.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

B. Zones – as indicated on drawings or as indicated below.

1. Unless indicated on the drawings, the entire building is a single general evacuation, notification and signaling zone.

2. Unless indicated on the drawings, an alarm event in any zone will generate a single general evacuation, which will include all notification and/or signaling zones.

3. Notification zones
   a. Notification zones are indicated on the drawings if present.
   b. If not indicated, notification zones are separated by the area that a Transponder serves.
   c. Alarms in a notification zone will generate activation of the following in the notification zone:
      1) Air Handler Shutdown for air handlers supplying that notification zone.
      2) Smoke Damper activation for ducts in or serving the zone.
      3) Recall of elevators and activation of shut down or shunt trips as indicated below.
      4) Activation of gas shutoffs serving that zone.

5) Activation of Smoke Control systems serving that Zone.
6) Activation of flow sensing within that zone.
7) All other activations will be general in nature.

d. Carbon Monoxide and Nitrogen Dioxide signals:
1) These signals will be treated as Supervisory signals except in the Notification Zone where the signal is generated.
2) Within the Notification Zone only, these signals are treated as an evacuation alarm, initiating the appropriate notification devices in the Notification Zone.
3) Notification within the Notification Zone will be with Carbon Monoxide ("ALERT") notification devices or Nitrogen Dioxide ("ALERT") notification devices respectively.

4. Signaling zones
a. Signaling zones may be defined on the drawings, if present.

2.4 FIRE-ALARM CONDUIT AND CABLE

A. Conduit

1. All fire alarm cable may be placed in conduit as indicated.

2. Conduit shall be in accordance with NFPA 70 (NEC) and the specifications of conduit.

3. Conduit fill shall not exceed 40 percent of interior cross sectional area.

4. Cable must be separated from any open conductors of power and/or Class 1 circuits. Fire alarm cable shall not be placed in any conduit, junction box or raceway containing non-fire alarm conductors.

5. Conduit shall be 3/4 inch minimum.

B. Cable mounting

1. Cabling not indicated as required to be in conduit shall be routed in aluminum bridle rings, no more than 6 feet apart, or routed in specifically indicated cable trays, attached to structural members and shall not be draped or supported directly on mechanical, architectural or structural items.

2. Fire alarm cabling shall not be supported or draped over non-structural elements such as heating/ventilation devices.

3. All connections will be enclosed in metal junction boxes. All devices will be mounted using metal or plastic junction boxes consistent with the area of installation and routing used.

C. Wire/Cable:

1. All fire alarm system wiring shall be new except as noted on the contract drawings.

2. Wiring shall be in accordance with all state, local, national or user codes and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer and as approved by the Architect/Engineer. Fire Alarm system cabling shall not be less than:
   a. Fire Alarm wiring/cabling shall not be less than 18 AWG for Initialing Device Circuits (IDC).
   b. Fire Alarm wiring/cabling shall not be less than 16 AWG for Notification Appliance Circuits (NAC).
   c. Fire Alarm wiring/cabling shall not be less than 14 AWG for Relay, Power and Auxiliary Device Circuits.
   d. Fire Alarm wiring/cabling shall not be less than 18 AWG for Voice Notification Appliance Circuits.
   e. Fire Alarm wiring/cabling shall not be less than 14 AWG for remote node communications.
   f. Cabling shall be shielded/twisted pair for both IDC and NAC circuit.

3. All wire and/or cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

4. Fire alarm cabling and wire shall be rated as FPLP (Plenum Rated) in all locations.

D. Cabling not indicated as required to be in conduit shall be routed in aluminum bridle rings, no more than 6 feet apart, or routed in specifically indicated cable trays, attached to structural members and shall not be draped or supported directly on mechanical, architectural or structural items.

2.5 FIRE-ALARM CONTROL UNIT (FACU)

A. The existing Fire Alarm Control Unit is: Siemens Cerberus FC-901. All devices shall be compatible with the existing system.

B. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1. Pathway Class Designations: NFPA 72, Class B.

2. Pathway Survivability: Level 0.

3. Install no more than 100 addressable devices on each signaling-line circuit.

C. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.

2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.

3. Record events by the system printer.

4. Sound general alarm if the alarm is verified.

5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

6. Verify sequence with owner.

D. A “Walk Test” shall be available at the control panel and may be optionally programmed into remote annunciator panels. The actuation of the “Walk Test” mode shall cause:

1. The remote central monitoring station connection shall be bypassed.

2. Only audible and visual appliances shall be operated. Other alarm functions (elevator recall, HVAC shutdown, etc.) shall not be affected.

3. Walk Test modes shall be selectable by entire system or by circuit, circuits or zones.

4. Actual alarms received during a “Walk Test” shall cause the control panel to go into alarm and shall override the “Walk “Test” mode.

5. The control panel shall show trouble and supervisory conditions.

6. The “Walk Test” activation of any initiation device shall cause the audible signals to activate for two seconds or other Engineer approved sound.

7. The panel shall automatically reset itself after signaling is complete.

8. The control panel shall automatically return to normal condition if no activity on a “Walk Test” circuit occurs for a period of 30 minutes.

E. Notification-Appliance Circuit:

1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.

2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.

3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

F. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.

G. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

H. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

I. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.6 MANUAL FIRE-ALARM BOXES

A. Ensure appliance is compatible with Fire Alarm Control Unit.

B. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.

2. Station Reset: Key- or wrench-operated switch.

2.7 SYSTEM SMOKE DETECTORS

A. Ensure appliance is compatible with Fire Alarm Control Unit

B. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.

2. Detectors shall be four-wire type.

3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.

5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.

6. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.

7. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
   a. Rate-of-rise temperature characteristic of combination smoke- and heat-detection units shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
   b. Fixed-temperature sensing characteristic of combination smoke- and heat-detection units shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
   c. Multiple levels of detection sensitivity for each sensor.
   d. Sensitivity levels based on time of day.

C. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
   a. Primary status.
   b. Device type.
   c. Present average value.
   d. Present sensitivity selected.
   e. Sensor range (normal, dirty, etc.).

D. Ionization Smoke Detector:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
   a. Primary status.
   b. Device type.
   c. Present average value.
   d. Present sensitivity selected.
   e. Sensor range (normal, dirty, etc.).

E. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
   a. Primary status.
   b. Device type.
   c. Present average value.
   d. Present sensitivity selected.
   e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.

4. Each sensor shall have multiple levels of detection sensitivity.

5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.

6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.8 CARBON MONOXIDE DETECTORS

A. General: Carbon monoxide detector listed for connection to fire-alarm system.

1. Mounting: Adapter plate for outlet box mounting.

2. Testable by introducing test carbon monoxide into the sensing cell.

3. Detector shall provide alarm contacts and trouble contacts.

4. Detector shall send trouble alarm when nearing end-of-life, power supply problems, or internal faults.

5. Comply with UL 2075.

6. Locate, mount, and wire according to manufacturer's written instructions.

7. Provide means for addressable connection to fire-alarm system. Connection will allow for variable level measurement to allow for selected control of devices.

8. Test button simulates an alarm condition.

9. Provide alarm condition upon NYS Building Code concentration values unless indicated.

10. Alarm condition will activate appropriate notification devices within the area of sensing and directly outside and visible from all entrances to that area.

2.9 HEAT DETECTORS

A. Ensure appliance is compatible with Fire Alarm Control Unit.

B. General Requirements for Heat Detectors: Comply with UL 521.

1. Temperature sensors shall test for and communicate the sensitivity range of the device.

C. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.

2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.10 NOTIFICATION APPLIANCES

A. Ensure notification appliances are compatible with Fire Alarm Control Unit.

B. Notification Devices shall have built in light and sound sensors to allow for testing and confirmation of proper operation without being at location of devices.

C. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

D. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol. Synchronize coded lights with temporal pattern, synchronized with other indicator devices, synchronized with visible output is present, and coded as required by NFPA 72.

E. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" or “ALERT” (for CO or Combustible Gas) is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output:
   a. 75 cd, unless otherwise indicated on the Drawings.
      1) Test and verify compliance with NFPA 72 after installation.

2. Mounting: Wall mounted unless otherwise indicated.

3. Flashing shall be in a temporal pattern, synchronized with other notification units and coded as required by NFPA 72. Fire alarm devices shall be Temporal 3 and Alert Devices shall be Temporal 4.

4. Strobe Leads: Factory connected to screw terminals.

5. Mounting Faceplate: Factory finished,
   a. Red for Fire with white light
   b. White for Alert with yellow light.

F. Voice/Tone Notification Appliances:

1. Comply with UL 1480.

2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.

3. High-Range Units: Rated 2 to 15 W.

4. Low-Range Units: Rated 1 to 2 W.

5. Mounting: surface mounted.

6. Matching Transformers: Tap range matched to acoustical environment of speaker location.

7. Adjust volume for each voice/tone appliance. Test and verify compliance with NFPA 72 after installation.

8. Tones shall be in a temporal pattern, synchronized with other notification units and coded as required by NFPA 72. Fire alarm devices shall be Temporal 3 and Alert Devices shall be Temporal 4.

2.11 ADDRESSABLE INTERFACE DEVICE

A. Ensure interfaces are compatible with Fire Alarm Control Unit.

B. General:

1. Include address-setting means on the module.

2. Store an internal identifying code for control panel use to identify the module type.

3. Listed for application indicated.

C. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

D. Control Module:

1. Operate notification devices not indicated above.

2. Initiate elevator recall.

3. Connect to elevator shunt trip for power shutdown after recall.

4. Signal to HVAC units to shut down fans as indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article entitled, "Fire Alarm Systems."

1. Devices placed in service before all other trades have completed cleanup shall be replaced.

2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.

1. Connect new equipment to existing control panel in existing part of the building.

2. Connect new equipment to existing monitoring equipment at the supervising station.

3. Expand, modify, and supplement existing control and monitoring equipment as necessary to extend existing control and monitoring functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.

D. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.

2. Mount manual fire-alarm box on a background of a contrasting color.

3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level. All devices shall be mounted at the same height unless otherwise indicated.

E. Smoke- or Heat-Detector Spacing:

1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.

2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.

3. Smooth ceiling spacing shall not exceed 30 feet (9 m).

4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A or Annex B in NFPA 72.

5. HVAC: Locate detectors not closer than 36 inches (910 mm) from air-supply diffuser or return-air opening.

6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.

F. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.

G. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

H. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

I. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

J. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.

K. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.3 PATHWAYS

A. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.

1. Exposed pathways located less than 96 inches (2440 mm) above the floor shall be installed in EMT.

B. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section labeled "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.

B. Make addressable connections with a supervised interface device to all devices and systems shown. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals.

B. Install framed instructions in a location visible from fire-alarm control unit.

3.6 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Visual Inspection: Conduct visual inspection prior to testing.
   a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
   b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4. Verify compliance with NFPA 72.

4. Test audible appliances for the private operating mode according to manufacturer's written instructions. Verify compliance with NFPA 72.

5. Test visible appliances for the public operating mode according to manufacturer's written instructions. Verify compliance with NFPA 72.

6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances. Testing will be same as initial system testing per NFPA 72.

F. Fire-alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 31 10 00

SITE PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 10 00 - Summary: Sequencing and staging requirements.

C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 01 57 13 - Temporary Erosion and Sediment Control.

E. Section 01 70 00 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.

F. Section 31 20 00 - Earthmoving: Topsoil removal.

G. Section 31 20 00 - Earthmoving: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 DEFINITIONS

A. Clearing shall be defined as the removal and disposal of trees, brush, vines, stumps, down timber, rotten wood, rubbish, any other vegetation, structures, concrete and objectionable material from surface areas within the Contractor's work area and as directed by the Owner’s Representative.

B. Topsoil Stripping shall be defined as the excavation and stockpiling on site of all topsoil necessary to complete the project.

C. Site grading consists of excavation, backfilling and grading to smoothly shape excavated slopes, embankment and fill slopes, and work areas to remove irregularities and to provide positive drainage during construction and for restoring the site.

D. Tree Protection Zone shall be defined as an area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual tress or the perimeter drip line of group of trees, unless otherwise indicated.

1.04 MATERIAL OWNERSHIP

A. Except for stripped topsoil, chipped tree materials, or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Site Plan: The Contractor shall submit its plan, for review by the Owner's Representative, for all clearing, topsoil stripping, and site grading as required to complete the work under this contract, also showing:

1. Vegetation removal limits.

2. Limits of existing pavement removals and replacements.

3. Limits of existing utility removals and replacements

1.06 QUALITY ASSURANCE

A. Clearing Firm: Company specializing in the type of work required.

1. Minimum of 5-years of documented experience.

1.07 PROJECT CONDITIONS

A. Occupancy: Owner may be continuously occupying buildings or areas immediately adjacent to areas of the site work. Conduct site work in a manner that will minimize need for disruption of the Owner's normal operations. Provide minimum of 72-hours advance notice to Owner of activities which will impact Owner's normal operations.

B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. All site access shall be strictly limited to the work areas shown on Plan C-100: Removals Plan. Staging areas shall be coordinated with the Owner prior to the start of work. No other areas shall be made available for use or occupation without written consent of Owner.

2. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

3. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

1. All signs and light fixtures are to be salvaged and turned over to Owner.

D. Notify utility locator service for area where project is located before site clearing.

E. Protections: Provide and maintain temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to site work.

1. Provide and maintain protective measures as required to maintain free and safe passage of Owner's personnel and the general public to and from occupied portions of on-site buildings.

2. Protect from damage existing work that is to remain in place and becomes exposed during removal operations.

3. Protect all trees and shrubs unless noted on plans to be removed.

4. Remove protections at completion of work.

F. Do not commence site clearing operations until all required temporary erosion and sedimentation control measures are in place.

G. Damages: Promptly repair damages caused to adjacent facilities by the site work at No Additional Cost to the Owner.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 SITE INVESTIGATION

A. Visit site before bidding and inform self of site conditions affecting work. No allowance will be made in the work of this contract for failing to determine site conditions.

B. Verify locations and protect utilities and structures, whether or not shown on the drawings. Existing utilities and structures shown on the drawings are for the Contractor's convenience and locations are not guaranteed.

C. Verify survey information given on drawings. Notify the Architect and/or Engineer of any and all discrepancies prior to commencing work. Commencement of work will be construed as complete acceptance of survey information.

D. Locate and protect from disturbance existing survey monuments, pins, marker and benchmarks whether or not shown on drawings. When any disturbance or damage occurs, notify Architect and/or Engineer in writing within 24-hours. Describe nature of disturbance or damage and date first occurred. Provide copies to applicable government and municipal agencies. Pay costs for restoring monument to satisfaction of said agencies, at no additional expense to the Owner.

E. Photographic documentation: Photographically document existing features which, may be affected by the construction, inside and outside the contract limit line. Existing features include, but are not limited to: structures, pavements, curbs, utilities, lawns and vegetation, especially individual trees which are over six (6) inches in diameter and noted to remain on the drawings. Also, particular attention shall be paid to the construction access, stockpile and haul road areas. Provide an electronic copy of all photographs to the Owner's Representative prior to commencement of construction activities.

3.02 SITE CLEARING

A. Comply with other requirements specified in Section 01 70 00.

B. Protect and maintain benchmarks and survey control points from disturbance during construction. Provide erosion-control measures as specified on the erosion control and sedimentation plan.

C. Locate and clearly flag trees and vegetation to remain and protect trees and vegetation to remain in accordance with the requirements of Section 3.4 of this specification.

D. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

E. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.03 EXISTING UTILITIES AND BUILT ELEMENTS

A. Contact all utility companies through Dig Safely New York (UFPO) at 1-800-962-7962 and the Owner which might have installations in the area to determine location of all utilities and structures. The Contractor is responsible to contact all utility owners whether or not they are part of the committee mentioned above.

B. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits. The Contract Drawings may not define all above ground or below ground utilities, structures, wells and other existing facilities at, or adjacent to the project site and work area. The Contractor shall identify, properly locate and protect all utilities, underground structures, above ground structures and appurtenances on, or adjacent to the project site. The Contractor shall also verify the location of all existing utilities prior to excavating for new work by coordinating with the Owner's Representative.

C. Protect existing utilities to remain from damage.

D. Do not disrupt public utilities without permit from authority having jurisdiction.

E. Protect existing structures and other elements that are not to be removed.

3.04 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas indicated on the project drawings.

B. Do not remove or damage vegetation beyond the limits indicated on drawings.

1. 10-feet each side of surface walkways, patios, surface parking, and utility lines less than 12-inches in diameter.

2. 15-feet each side of roadway curbs and main utility trenches.

3. Exception: Specific trees and vegetation indicated on drawings to be removed.

C. Erect and maintain a temporary, highly visible, green construction safety fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete:

1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.

2. Do not permit vehicles, equipment, or foot traffic within drip-line of remaining trees.

D. Do not excavate within drip line of trees, unless otherwise indicated.

E. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

1. Cover exposed roots with burlap and water regularly.

2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

F. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.

1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.

2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18-inches.

3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18-inches.

4. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.

5. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.

G. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush within project limits; treat as specified for vegetation removed.

H. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.05 PROTECTION AND RESTORATION

A. The Contractor shall protect all utilities, manholes, trees, plant growth and other features unless stated or shown to be removed.

B. The Contractor shall protect all sidewalks and walkways along the permitted access route and in the immediate vicinity of the project. Any damage to the sidewalks and concrete shall be repaired at no cost to the Owner and to Owner's satisfaction using materials of matching color and patterns.

C. Manholes, trees, shrubs and plants, utilities, fences and other features damaged by the Contractor's operations shall be replaced by the Contractor at no additional cost to the Owner.

D. The Contractor shall not trespass beyond the Contract Limits shown on the Contract Drawings. Protect all adjacent properties and structures and use every means possible to prevent erosion, flooding, undermining, excessive excavation, or other damage during any construction or site improvement operations. Repair all damage in a manner specified by, and to the satisfaction of, the Owner's Representative.

E. The Contractor shall control dust in all work or occupied areas by sprinkling with potable water or by other methods in accordance with applicable laws and approved by the Owner's Representative. Petroleum products shall not be utilized.

F. Upon completion of work, the Contractor shall remove protective materials, enclosures and guards.

G. Provide traffic control as required, in accordance with the New York State Department of Transportation "A Manual of Uniform Traffic Control Devices".

H. Protect benchmarks, property corners and all other survey monuments from damage or displacement. Any survey markers removed by the Contractor shall be replaced by a licensed land surveyor at no cost to the Owner.

3.06 UTILITIES

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner Representative not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Owner Representative's written permission.

3.07 CLEARING

A. The Contractor shall perform clearing within the limits shown on the Contract Drawings or as directed by the Owner's Representative.

B. Do not remove or damage vegetation beyond the limits indicated on Contract Drawings.

C. Install substantial, highly visible fences at least 3-feet high to prevent inadvertent damage to vegetation to remain at vegetation removal limits.

D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.

1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.

2. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.

E. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no additional cost to OWNER.

3.08 TOPSOIL STRIPPING

A. The Contractor shall perform topsoil stripping within the areas to be filled or excavated as shown on the Contract Drawings and as directed by the Owner's Representative. The Contractor shall stockpile and maintain all excavated topsoil at a location off-site until final site quantities needed for project completion are determined. Topsoil brought on site for reuse shall be stockpiled in a location approved by the Owner's Representative. Any stockpiles in place for more than **7-days** shall be stabilized and seeded in accordance with the NYSDEC Regulations, as shown on the ESC plans, and in accordance with Section 31.

3.09 SITE GRADING DURING CONSTRUCTION

A. The Contractor shall grade work areas as necessary during construction to divert surface water runoff from excavations and to provide positive drainage. Contractor shall grade the existing sub-grades, as necessary to remove irregularities prior to construction of overlying components. The Contractor shall grade any other locations affected by the project work as directed by the Owner's Representative.

3.10 FINISH GRADING

A. On completion of the work, the Contractor shall: clean all existing ditches, swales, channels and drainage features and restore them to their pre-construction condition or better; restore and finish the site in a neat and presentable condition as approved by the Owner's Representative. Areas to be restored shall include all access roads, lay down areas, parking areas and trailer areas; and stockpile areas. All restored areas shall be re-established at previous grades or as shown.

B. The Contractor shall construct and grade all proposed drainage swales, and grade the site to provide positive drainage as shown or as directed and approved by the Owner's Representative.

3.11 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove pavements, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.12 DISPOSAL

A. All materials removed as a result of clearing, stripping, excavation and site grading, which are not to be reused, shall be transported to and disposed at an off-site by the Contractor. Transport and disposal shall be in accordance with applicable laws, regulations and codes.

B. The Contractor shall not burn the debris resulting from this work on the site.

3.13 QUALITY ASSURANCE

A. All subgrades will be monitored and tested as determined necessary by the Owner's Representative. The Owner will retain the services of a testing and inspection firm to complete the special inspections as required by Section 1704.7.1 of the New York State Building Code.

END OF SECTION

SECTION 31 20 00

EARTHMOVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Stripping and stockpiling of existing, on-site topsoil.

B. Rough grading for pavements.

C. Finish grading .

1.02 RELATED REQUIREMENTS

A. Section 31 10 00 - Site Preparation.

B. Section 31 23 23 – Trenching and Backfilling: Trenching and backfilling for utilities.

C. Section 32 92 19 - Seeding: Finish ground cover.

1.03 PRICE AND PAYMENT PROCEDURES

A. Topsoil:

1. Measurement Method: By the cubic yard.

2. Includes (for on-site material): Excavating existing topsoil, transport to central location on site and stockpiling, scarifying substrate surface, placing where required, and compacting.

3. Includes (for imported material): Import, placement where required, and compaction.

B. Common Earth Fill:

1. Measurement Method: By the cubic yard.

2. Includes (for on-site material): Excavation existing common earth fill, transport to central location on site and stockpiling, scarifying substrate surface, placement where required, and compaction.

3. Includes (for imported material): Import, placement where required, and compaction.

C. Subbase Material, Select Granular Fill, Drainage Course, Stone Bedding Material, and Sand Bedding:

1. Measurement Method: By the cubic yard.

2. Includes: Import, placement where required, and compaction.

D. Stone Fill (Rip-rap):

1. Measurement Method: By the cubic yard.

2. Includes: Import, and placement where required.

E. Subbase Preparation:

1. Measurement Method: By square yard.

2. Includes: Scarifying substrate and compacting.

1.04 DEFINITIONS

A. Earth excavation is the removal of in-place overburden soils and fill materials using proper earth moving equipment. Earth materials shall include all soil deposits of any description both above and below groundwater levels. These may be naturally deposited or placed by previous construction operations.

B. Fill placement, backfilling and embankment construction are the placement and compaction of earthen materials to construct and establish all necessary slopes, site grading and drainage, piping and associated site improvements.

C. Authorized earth excavation is excavation of overburden soils, materials and rock to the excavation limits shown. It includes excavation of material considered unsuitable by the Owner's Representative and other excavation as directed by the Owner's Representative.

D. Unauthorized excavation is excavation of soil and/or rock materials beyond the limits shown that are not authorized by the Owner's Representative.

E. Unsuitable Material shall mean debris, frozen materials, topsoil, organic matter or peat, and other such soft or loose material which does not remain in position or stable when cut for excavation or which does not have sufficient bearing capacity to support the loads placed upon it without movement.

F. Loose Rock shall be shale, slate, soft sandstone, nested boulders or cobbles, boulders and such other soft rocks which are decomposed, stratified or shattered to an extent that modern power-driven equipment normally used for earth excavation will readily remove it.

G. Solid rock shall include dolomite, limestone, hard sandstone, large boulders each more than one cubic yard in volume, and other rocks which cannot be removed by power-driven equipment normally used in earth excavation except those specifically named under the definition of loose rock.

1.05 JOB CONDITIONS

A. The location of above ground and underground facilities, where shown on the Contract Drawings, are based on survey for visible above ground features and on available record mapping for underground features. The Contract Drawings may not define all above ground or below ground utilities, structures, wells and other existing facilities at, or adjacent to the project site and work area. The Contractor shall identify, properly locate and protect all utilities, underground structures, above ground structures and appurtenances on, or adjacent to the project site. The Contractor shall verify the location of all existing utilities prior to excavating for new work by contacting U.F.P.O., and by coordinating with the Owner's Representative.

B. The Contractor shall remove all excess materials from the site and dispose of them in accordance with applicable laws. The cost for removal shall be included in the amount bid. No additional payment will be made.

C. The Contractor shall stockpile and maintain all excavated topsoil on site until final site quantities needed for project completion are determined. Topsoil shall be processed to meet the material requirements of this specification prior to placement in the stockpile. Stockpiles shall be stabilized and seeded as required in the New York Standards and Specifications for Erosion and Sediment Control and as shown on the Erosion and Sediment Control (ESC) plans.

D. No frozen soil shall be placed during construction and no soil shall be placed on frozen soil.

E. Access-Ways and Staging Areas

1. The Contractor shall construct temporary access-ways as necessary to provide access to the work area, at the location shown on the Contract Drawings and as approved by the Owner's Representative.

2. The Contractor shall remove all temporary access-ways when no longer needed, and restore the site to conditions as directed and approved by the Owner's Representative.

F. Dust Control

1. The Contractor shall control dust in all work or occupied areas by sprinkling with potable water or by other methods in accordance with applicable laws and approved by the Owner's Representative. Petroleum products shall not be utilized.

2. Maintain dust control measures through dry periods until all disturbed areas are stabilized.

3. Vegetative measures shall be used on all disturbed areas not subjected to traffic. No other form of dust control will be permitted for use on these areas.

4. Sprinkling with water shall be used on haul roads and access routes, as required, until stone is applied.

5. Barriers shall be used wherever practical to achieve dust control for a distance of up to 10 times the barrier height. Preserve existing wind barrier vegetation to the fullest extent practical.

6. Mulch shall be used wherever practical, as it offers a fast effective means of controlling dust.

1.06 QUALITY ASSURANCE

A. Comply with: New York State Department of Transportation (NYSDOT) "Standard Specifications for Construction and Materials."

B. Routine testing of existing soils and compacted material for compliance with these specifications will be performed as part of Special Inspections.

C. Compacted material not meeting density requirements shall be removed or re-compacted and retested at Contractor's expense.

1.07 SUBMITTALS

A. General: Submittals shall be made according to the conditions of the Contract and Division 01 Specifications Sections.

B. The Contractor shall submit: proposed equipment; dust control procedures; off-site material sources and test data showing that proposed material sources meet the specified requirements; earthwork procedures; material handling and stockpiling procedures; and locations, material placement procedures and quality control plans as required by the Owner's Representative.

C. Specific Submittals for Materials shall include:

1. Samples: Submit samples as follows. Take the samples in the presence of the Owner's Representative, and submit to the Owner's Representative the laboratory test results for gradation, proctors and soundness tests, when required. These tests shall be performed in accordance with ASTM standards, shall be performed and signed by a certified soils laboratory, and shall be submitted as part of the original submittal. At a minimum the samples taken shall be of the following quantities:
   a. Topsoil: 50 - 60 lb. (Two samples for each proposed source).
   b. Common Earth Fill: 50 - 60 lb. (Two samples for each proposed source).
   c. Subbase Course Type 2: 50 - 60 lb. (Two samples for each proposed source).
   d. Select Granular Material: 50 - 60 lb. (Two samples for each proposed source).
   e. Drainage Course: 50 - 60 lb. (Two samples for each proposed source).
   f. Stone Bedding: 50 lb. (One sample for each proposed source).
   g. Sand Backfill: (One sample for each proposed source).

2. Quality Control Submittals:
    a. Subbase Course Type 2, Select Granular Material, Stone Bedding, and Sand Bedding: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
    b. Stone Fill (Rip-rap): Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
    c. Drainage Stone: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
    d. Topsoil and Common Earth Fill: If the material is not being taken from onsite, name and location of proposed source. Verification shall also be submitted that the materials are not from contaminated sites or sources.
    e. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for the Owner's Representative information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.
    f. Upon completion of grading operations contractor shall supply an as-built map showing compliance with proposed grades and showing the installed locations of all constructed features.

3. As-built survey mapping: Upon completion of the installation of all proposed features, the contractor shall provide an as-built survey map showing all features within the project limits. Surveyed features shall include but not be limited to all installed pavements, curbing, fences, signage, plantings, underground utilities, aboveground utilities, contours depicting the grades constructed, and existing features that abut to the installed features. Mapping shall also include rims and inverts for installed utility structures.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Topsoil - for landscaped areas.

1. Topsoil shall meet the material requirements of NYSDOT §713-01, Topsoil, and as required below. On site material shall be permitted in accordance with this specification. The Contractor shall import a sufficient amount of material to complete the work if there is not enough on site material to meet the project requirements.

2. Topsoil shall be free of refuse, snow, ice, any material toxic to plant growth, subsoil, woody vegetation and stumps, roots, brush, stones, clay lumps, and objects larger than 2-inches in greatest dimension. Sod and herbaceous growth such as grass and weeds need not be removed but shall be thoroughly broken up and mixed with the soil during handling operations.

3. Topsoil shall meet the following requirements, and as approved by the Owner's Representative:
   a. The pH of the material shall be between 5.5 and 7.6.
   b. The organic content shall be not less than 6 percent or more than 12 percent.
   c. It shall be well graded with a maximum particle size equivalent to a No. 10 sieve with 90 to 100 percent passing the No. 10 sieve, with 45 to 80 percent passing the No. 40 sieve, with 25 percent to 70 percent by weight passing a No. 200 sieve, and with 5 to 35 percent passing the 2 micron sieve.

B. Common Earth Fill - for general grading in landscape areas, pavement subgrade material, and trench backfill in non-pavement areas.

1. Common Earth Fill shall be on-site excavated material consisting of any natural inorganic soil (gravel, sand, silt and clay mixture), or manmade crusher run stone, or gravel and sand product, including mixtures thereof. No aggregate shall be larger than 4-inches in size.

2. Determination of whether a specific material is suitable shall be made by the Owner's Representative based on appropriate quality assurance test results provided by the Contractor. Fill shall be free of frozen material, boulders, trash, cinders, ashes, asphalt, and foreign debris. Material containing vegetation or significant organic matter, such as peat or organic silt, sod, ice, snow or other deleterious material, is not acceptable. Topsoil and organic silt may be used in landscaped areas and areas where overlying construction is not proposed.

3. If the excavated material on site is suitable to the Owner's Representative for backfilling purposes, it shall be used and the surplus properly disposed of.

C. Subbase Type 2 (Crusher Run Stone) - for subbase under all pavements such as parking lots, dumpster slab, walkways, and sidewalks, or for use as Select Granular Fill.

1. The material used shall be angular crusher-run stone as delivered unsorted from the crusher. The material shall be clean, well graded, durable, and composed of rock pieces, chips and fines. The minimum size shall be sufficient to fill all voids between large stones when the material is compacted. The material shall conform to NYSDOT Specification 304, Type 2 and have the following gradation requirements.

Sieve Size	**Percent Passing**
2-inch	100
¼-inch	25 – 60

No. 40	5 – 40
No. 200	0 - 10

2. The material shall also meet the following material requirements.
   a. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after 4 test cycles.
   b. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
   c. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a ½-inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than 3 times its least dimension.

D. Select Granular Fill (Run of Bank) - for undercuts up to Subbase courses, for trench bedding between top of Stone Bedding and pavement.

1. The material shall be a mixture of hard, durable stone and coarse sand, practically free from silt, clay, organic matter or other foreign matter. No gravel shall be used on this project until acceptance is obtained from the Owner's Representative and only gravel from approved sources shall be used.

2. This material, referred to as "Run Of Bank" gravel or "R.O.B." gravel shall be well-graded conforming to NYSDOT Specification 304, Type 4 and have the following gradation:

Sieve Size	**Percent Passing**
2-inch	100
¼-inch	30 – 65
No. 40	5 – 40
No. 200	0 - 10

3. The material shall also meet the following material requirements.
   a. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after 4 test cycles.
   b. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
   c. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a ½-inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than 3 times its least dimension.

E. Drainage Course: Narrowly graded mixture of washed crushed stone or gravel; ASTM D 448; coarse-aggregate grading AASHTO Size #2; with 100 percent passing a 3-inch sieve, 90-100% passing the 2 ½-in sieve, 35-70% passing the 2-in. sieve, 0-15% passing the 1 ½-in sieve and 0-5 percent passing a ¾-in. sieve

F. Stone Bedding (Pipe Bedding or Crushed Stone) – for bedding of utility conduits, pipes, and mains, or for use as Select Granular Fill.

1. The material used shall be clean, sound crushed stone of uniform quality. It shall be a 50-50 mixture of NYSDOT size designation #1 and #2 stone conforming to NYSDOT Item 703-2, Gradation Table 703-4.

G. Stone Fill (Riprap) - for protection of storm sewer outlets, channel outlets, and other areas susceptible to erosion.

1. This material shall be well graded stone placed as protective material on stream-banks, in channels, and as specified on the Contract Drawings, or as required by the Qualified Professional for storm water pollution prevention. The material shall conform to NYSDOT Specification 620-2.02 and meet the gradation requirements of Figure 620-1 for Fine, Light, Medium, or Heavy Stone Fill, as specified on the Contract Drawings or as determined necessary by the Qualified Professional.

H. Sand Bedding - for base and leveling course beneath unit pavers.

1. This material shall comply with the material requirements of NYSDOT Article 703-03 Mortar Sand and shall be meet the following gradation requirements:

Sieve Size	**Percent Passing**
No. 4	100
No. 8	95 – 100
No. 50	10 – 40
No. 100	0 - 15

2.02 SOURCE OF MATERIALS

A. All materials shall be provided by the Contractor from sources that demonstrate, through appropriate sampling and testing, that they can produce the materials as specified. On-site excavated materials may be used for Topsoil, and Common Earth Fill providing these materials comply with the contract requirements.

B. Offsite sources shall be identified to the Owner's Representative for review and approval prior to delivery to and use at the site. No materials shall be delivered or used until completion of the quality assurance and control testing and such materials are approved by the Owner's Representative.

PART 3 - EXECUTION

3.01 LAYOUT

A. The provisions of NYSDOT Standard Specification §203 shall apply to all earth excavation, filling and backfilling.

B. The Contractor must accurately locate and maintain location of all buildings, roads, utilities, other features, and advise the Owner's Representative of any discrepancies prior to commencing work. The contractor shall contact U.F.P.O. to confirm underground facilities locations prior to excavating.

C. Work shall be scheduled so the deepest elements are completed first when undermining of shallower elements could occur.

3.02 PROTECTION OF SUBGRADES AND FILL GRADES

A. The subgrade soils may be sensitive to disturbance from construction activity and when in the presence of moisture. Water shall not be allowed to collect on earthen fill surfaces. The Contractor shall also properly drain and protect all grades.

B. Failure of the Contractor to properly excavate and protect approved subgrades resulting in additional excavation and backfill to attain a suitable subgrade in accordance with these specifications shall be at no cost to the Owner.

C. The Contractor shall maintain both work in progress and completed work until the construction is complete and accepted by the Owner's Representative. Any erosion or degradation of the Contractor's work shall be repaired by the Contractor at no cost to the Owner.

3.03 DEWATERING

A. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.

B. Do not allow water to accumulate in excavations or trenches, or on prepared subgrades or previously placed earth materials. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.

C. All pumps and water removal methods shall be designed, installed, and operated in a manner that does not result in loss of ground or removal of fines during operation and that is consistent with Section 31 23 19 Dewatering. Should loss of fines be noted, water removal shall cease immediately and the Owner's Representative notified. The Contractor shall modify the water removal methods as necessary to eliminate further loss of ground, and shall repair any such loss of ground to the satisfaction of the Owner's Representative.

3.04 EQUIPMENT

A. It is the responsibility of the Contractor to select, furnish and properly maintain equipment which will excavate and compact subgrade and fill materials uniformly to the required density.

3.05 STRIPPING TOPSOIL

A. Stripping: Prior to starting general excavation, all topsoil within the limits of the existing lawn areas shall be stripped to its full depth and stockpiled in approved locations for later reuse. **Do not strip topsoil when it is in a wet or moist condition. Wait to move until the water has drained out of the topsoil.** All stockpiled topsoil shall be protected from wind and water erosion as specified.

B. Contractor shall have the existing topsoil tested for reuse as specified in this Section, and submit the results to the Engineer for approval.

C. Contractor shall not remove existing topsoil from the contract limits of Work without the written approval of the Engineer.

3.06 EARTH EXCAVATION AND GRADING

A. All excavation and grading work shall be executed to the lines and grades shown on the Contract Drawings, unless directed otherwise by the Owner's Representative. All excavation shall be performed in such a manner as to minimize disturbance and maintain stability of subgrade soils and slopes. Special care shall be taken not to disturb the bottom of excavations and proposed bearing elevations and surfaces. Excavation to the final subgrade levels must be done by methods that minimize traffic on or disturbance to the subgrade.

B. The excavation equipment must be of such size and capacity sufficient to excavate the materials encountered and to the specified depths as shown.

C. The Contractor shall be responsible at all times for safe and prudent excavation operations so as to protect the workmen, utilities, structures, and adjacent property. The Contractor shall perform all excavation in accordance with OSHA standards. The Contractor shall observe all applicable local, state and federal requirements and acquire all necessary permits.

D. The Contractor shall bench or cut back excavated slopes, dewater and sheet, as necessary for stability, safety and protection of adjacent utilities, structures, and properties.

E. Subgrades and slopes which have been damaged or degraded as a result of Contractor's activities, or failure of the Contractor to properly protect them shall be repaired at the Contractor's expense as directed by the Owner's Representative.

F. Subgrades in which soft or unsuitable materials are encountered that are not a result of Contractor's operations or failure to protect subgrades shall be undercut and backfilled with appropriate fill as directed by the Owner's Representative.

G. All subgrades will be monitored and tested, at the Owner's expense, as determined necessary by the Owner's Representative. The Contractor, at the direction of the Owner's Representative, shall be required to proof roll subgrades. All proof rolling, if required, shall be done in the presence of the Owner's Representative, as follows:

   1. Notify the Owner's Representative of the proposed date for beginning proof rolling at least seven (7) working days prior to commencing proof rolling.

   2. Proof rolling operations shall not occur within 36-hours after a rain event. Work areas shall be protected from rain or given sufficient time to dry prior to commencing proof rolling.

   3. Proof roll the prepared subgrade surface with at least four (4) passes of a suitable compaction equipment; a vibratory drum compactor having a minimum unsprung drum weight of 7-tons or a vibratory roller operated in static mode weighing approximately 15-tons.

H. The proof rolling operations shall be observed by the Owner's Representative and Inspector. No materials beyond the limits of subgrade shall be excavated or fill materials placed by the Contractor until the subgrades are observed and tested by the Owner's Representative.

I. Subgrades shall be graded at a slope that will match the slope of the proposed finished surface grades.

3.07 FILLING AND BACKFILLING

A. The Contractor shall not place fill or backfill until underlying subgrades have been observed and tested as required by the Owner's Representative. Notify the Owner's Representative at least three (3) working days in advance of all phases of filling and backfilling operations for scheduling of testing.

B. Materials shall be placed at the locations shown on the Contract Drawings, and as directed by the Owner's Representative.

C. Delivery and compaction of materials shall be made during the presence of the Owner's Representative and shall be subject to its review. This inspection by no means absolves the Contractor from responsibility to properly compact and test as specified.

D. Acceptance and/or rejection of materials placed and compacted shall be based upon in-place density test result requirements and other requirements as stated in these specifications.

3.08 PLACEMENT AND COMPACTION

A. Compaction density tests will be required for all types of materials used on this project. Areas for testing will be randomly selected by the Owner's Representative and can be in any construction area. Frequency of tests shall be in accordance with Section 3.09 herein.

B. Methods and equipment proposed for compaction shall be selected by the Contractor and shall be subject to the prior approval of the Owner's Representative. If compacting by rolling or operation of heavy equipment near structures and utilities, displacement of or injury to pipe and structures shall be avoided. Movement of in-place structures or pipe shall be at the Contractor's risk. Any pipe or structure damaged thereby shall be replaced or repaired as directed by the Owner's Representative at no additional cost to the Owner.

C. If compaction tests do not meet the specifications herein, the Contractor shall change their methods of operation and, or their backfill materials, until satisfactory test results are achieved and all such changes shall be at no additional cost to the Owner.

D. All fill shall be placed in lifts of generally uniform thickness and lifts shall be placed in a horizontal orientation.

E. Moisture Control:

1. Where fill or backfill must be moisture conditioned before compaction, uniformly apply water to the surface and to each layer of fill or backfill. Prevent ponding or other free water on surface subsequent to, and during compaction operations.

2. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to specified density. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a value which will permit compaction to the percentage of maximum density specified.

3. **Do not spread topsoil when it is in a wet or moist condition. Cover topsoil stockpiles with tarpaulins or other impervious materials to prevent water from accumulating in the soil. If topsoil is wet or moist at the time of finish grading, leave topsoil to dewater before moving and spreading topsoil. Failure by the Contractor to protect topsoil from becoming wet/moist will not relieve the Contractor from meeting project schedule deadlines.**

F. Inadequate compaction shall be cause for the Owner's Representative to issue a stop work order to the Contractor.

1. Topsoil
   a. The Contractor shall scarify or till the surface of the subgrade to a depth of 4-inches and moisten it before topsoil is placed to support bonding of the topsoil with the subsoil. Tillage by discing, harrowing, raking or other approved methods shall be accomplished in such a manner that depressions and ridges formed by tillage shall be parallel to the contours. Rocks and debris larger than 1-inch shall be removed by screening or other approved methods.
   b. Topsoil in an unworkable condition due to excessive moisture, frost or other conditions shall not be placed until it is suitable for spreading. Topsoil shall be placed and spread on the designated area and graded to the minimum thickness specified in the specification sections referenced herein and on the Contract Drawings, unless otherwise directed by the Owner's Representative. After the topsoil is spread, all large stiff clods, rocks, roots or other foreign matter shall be cleared and disposed of by the Contractor as approved so that the finished surface will be acceptable for subsequent compaction and seeding.
   c. Topsoil shall be compacted sufficiently to avoid settlement in excess of 1-inch. However, compaction shall not exceed 85% of the maximum dry density, as determined by ASTM D1557.

2. Common Earth Fill
   a. Fill shall be placed in maximum loose lift thicknesses of 9-inches for compaction with heavy equipment or in maximum lifts of 6-inches where the use of hand compaction equipment is necessary. Lifts shall be placed in nearly horizontal orientation. Fill shall be compacted to a minimum of 90-percent of the maximum dry density, as determined by ASTM D1557, except under pavement areas where it shall be compacted to a minimum of 95-percent of the maximum dry density.

b. Equipment used to compact fill must be compatible with the material type, lift thickness, and constraints posed by size and configuration of excavated area being filled.
c. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

3. Subbase
   a. Subbase shall be placed in maximum loose lift thicknesses of 9-inches for compaction with heavy equipment or in maximum lifts of 6-inches where the use of hand compaction equipment is necessary. Lifts shall be placed in nearly horizontal orientation. Place Types 2 or 4 subbase so that after compaction the top surface of the course does not extend more than 1/4-in above nor more than 1/4-in below true grade for the course at any location.
   b. Subbase shall be compacted to a minimum of 95-percent of the maximum dry density, as determined by ASTM D1557. Equipment used to compact subbase must be compatible with the material type, lift thickness, and constraints posed by size and configuration of excavated area being filled.
   c. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.
   d. After subbase layer has been placed, compacted, and approved, construction vehicle traffic over the approved surface shall be limited or the Contractor shall install a protective 2-inch layer of stone at No Additional Cost to the Owner. Prior to paving, the 2-inch layer of stone would then be removed and the exposed surface prepared and compacted to receive pavement.
   e. If subbase is damaged or mixed with subgrade or any other material due to Contractor's operation, remove such material and replace it with the appropriate subbase material at No Additional Cost to the Owner.

4. Select Granular Fill
   a. Select fill shall be placed in maximum loose lift thicknesses of 9-inches for compaction with heavy equipment or in maximum lifts of 6-inches where the use of hand compaction equipment is necessary. Lifts shall be placed in nearly horizontal orientation. Fill shall be compacted to a minimum of 95-percent of the maximum dry density, as determined by ASTM D1557.
   b. Equipment used to compact fill must be compatible with the material type, lift thickness, and constraints posed by size and configuration of excavated area being filled.
   c. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

5. Stone Bedding
    a. Bedding shall be placed in maximum loose lift thicknesses of 9-inches for compaction with heavy equipment or in maximum lifts of 6-inches where the use of hand compaction equipment is necessary. Lifts shall be placed in nearly horizontal orientation. Bedding fill shall be compacted to a minimum of 95 percent of the maximum dry density, as determined by ASTM D1557.
    b. Equipment used to compact bedding must be compatible with the material type, lift thickness, and constraints posed by size and configuration of excavated area being filled.
    c. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

6. Stone Fill
    a. Shall be placed as described in the NYSDOT Standard Specifications, latest edition, Section 620-3.02.

7. Sand Bedding
    a. Sand bedding shall be placed in maximum loose lift thicknesses of 9-inches for compaction with heavy equipment or in maximum lifts of 6-inches where the use of hand compaction equipment is necessary. Lifts shall be placed in nearly horizontal orientation. Fill shall be compacted to a minimum of 95-percent of the maximum dry density, as determined by ASTM D1557.
    b. Equipment used to compact fill must be compatible with the material type, lift thickness, and constraints posed by size and configuration of excavated area being filled.
    c. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

3.09 QUALITY ASSURANCE AND CONTROL TESTING

A. The Owner will retain the services of a testing and inspection firm to complete the special inspections required by Section 1704.7 of the New York State Building Code. The special inspector shall provide visual observations and document these observations in accordance with Section 1704.7 of the New York State Building Code for special inspection services necessary for subgrade preparation (1704.7.1). The qualifications of the individuals performing the special inspections shall be in accordance with the requirements of the New York State Building Code.

B. Services and quantities of testing, as specified herein, are approximate and provided for information. Additional testing may be required by the Owner's Representative if in the opinion of the Owner's Representative, substantial variation in the nature and consistency of the soil materials are observed during construction or if material sources change.

C. The types of tests that are to be conducted include, but are not limited to:

Test Number	Test Description
1	Natural Moisture Content (ASTM D-2216)
2	Grain Size Analysis (ASTM D-422)
3	Liquid and Plastic Limits (ASTM D-4318)
4	Moisture-Density Relationship (ASTM D-1557) or other appropriate test determined by the Owner's Representative where material gradation does not permit use of ASTM D –1557
5	In-Place Density (ASTM D-1556 or ASTM D-2922)
6	Soil pH (ASTM D-2976)
7	Organic Content (ASTM D-2974)

D. Pre-Construction Tests: Before delivery of materials to or use at the site, the Contractor shall submit adequate quantities of each proposed material to the Owner's Testing Laboratory for performing the above stated tests on the required minimum number of samples obtained from each proposed source, as follows

Material	Test Number	Test Frequency (per proposed source)
Topsoil	1, 2, 6 and 7	2
Common Earth Fill	1,2, 3, and 4	2
Subbase Type 2	1,2, and 4	2
Select Granular Fill	1,2, and 4	2
Stone Bedding	1,2, and 4	2
Stone Fill	2 (visual)	1
Sand Bedding	1,2, 3, and 4	2

E. During Construction Tests: During construction, the Testing Laboratory shall perform the above listed tests, verify the material types being used, and lift thickness, as requested by and reimbursed through the Owner, in accordance with the following:

Material	Test Number	Test Frequency
Topsoil	1, 2, 6 and 7	1, 2, 6 & 7 Every 10,000 cy of material used but, not less than 2 tests.
Common Earth Fill	1, 2, 3, 4, and 5	1,2, & 3 Every 10,000 cy of material used but, not less than 2 tests. 2 & 4 at visible changes in material. 5 every 250 cy placed and/or one (1) test per lift of placed material.
Subbase Type 2	1, 2, and 5	1and 2 Every 5,000 cy of material used but, not less than 2 tests per lift. 2 & 4 at visible change in material or source change. 5 Every 150 cy placed and/or one (1) test per lift of placed material
Select Granular Fill	1, 2, and 5	1 and 2 Every 5,000 cy of material used but, not less than 2 tests per lift.

Material	Test Number	Test Frequency	
		2 & 4	at visible change in material or source change.
		5	Every 150 cy placed and/or one (1) test per lift of placed material.
Stone Bedding	1, 2, 4, and 5	1 and 2	Every 5,000 cy of material used but, not less than 2 tests per lift;
		2 & 4	at visible change in material or source change.
		5	1 per lift for every 500 linear feet of pipe but, not less than 1 per lift for each trench or every 150 cy placed if beneath slabs and pavement.
Sand Bedding	1, 2, 4, and 5	1,2, & 3	Every 5,000 cy of material used but, not less than 2 tests per lift;
		2 & 4	at visible changes in material or source change.
		5	Every 150 cy placed. and/or one (1) test per lift of placed material

The test frequency shown above may be increased at the discretion and direction of the Owner's Representative.

3.10 MAINTENANCE AND RESTORATION

A. Restore grades to indicated levels where settlement or damage due to performance of the Work has occurred. Correct conditions contributing to settlement. Remove and replace improperly placed or poorly compacted fill materials at No Additional Cost to the Owner.

B. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

C. Topsoil and seed or sod damaged lawn areas outside the Grading Limit Line and the new lawn areas inside the Grading Limit Line. Water as required in accordance with Section 32 92 19 Seeding.

3.11 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Owner's Representative.

B. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surface water management.

B. Management of water in excavations.

1.02 RELATED REQUIREMENTS

A. Section 01 57 13 - Temporary Erosion and Sedimentation Control: Slope protection and erosion control.

1.03 SUMMARY

A. This section specifies dewatering that consists of performing all work necessary to remove snow, ice, surface water, and/or control other water infiltration in order that all excavation and construction is performed in the dry. The Contractor shall maintain and operate adequate surface and subsurface drainage methods to the satisfaction of the Owner's Representative in order to keep the construction site dry and excavation side slopes and bottom stable such that all construction can proceed unhindered by saturation and degradation of the area in accordance with the plans and specifications and to the satisfaction of the Owner's Representative.

B. Dewatering work shall include all design installation, operation, maintenance, supervision, dismantling and removal from the site, including proper site restoration of dewatering systems required to perform the work as shown and specified herein.

C. The required dewatering system should be designed by a Professional Engineer licensed to practice engineering in New York State.

1.04 GENERAL

A. The Contractor must become familiar with the potential for precipitation, the site conditions, and the subsurface conditions.

B. The Contractor shall have on site such equipment as pumps, hoses, etc., as necessary to deal with dewatering. Dewatering system(s) shall be properly designed and constructed to prevent removal of soil fines from the site during dewatering operation. The Contractor shall monitor the dewatering system and should loss of fines be noted water removal shall cease immediately and the Owner's Representative notified. The Contractor shall modify the water removal methods as necessary to eliminate further loss of ground, and shall repair any such loss of ground to the satisfaction of the Owner's Representative.

C. If ponded water, from any source, surface or subsurface, accumulates or collects on prepared subgrades, in excavations, or on fill surfaces, the subgrade surfaces shall be excavated and replaced as directed by the Owner's Representative, at no additional cost to the Owner.

1.05 SUBMITTALS

A. General: Submittals shall be made according to the conditions of the Contract and Division 01 Specifications Sections.

B. Submit and review proposed dewatering methods with the Owner's Representative prior to commencing dewatering operations.

C. Submit proposed procedures and material specifications for all erosion control materials prior to commencing field activities.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Straw bales, as required by the Owner's Representative.

B. Silt fencing and associated materials shall be as shown on the Contract Drawings. Filter cloth shall be Geotex 701, Mirafi 170N, Winfab 800N or approved equal.

C. Earth materials shall be as specified in Earthmoving, Section 31 20 00.

D. Temporary Seeding shall as specified in Seeding, Section 32 92 19.

E. Dust Control shall consist of vegetative covers, sprinkling (water), barrier material (silt fence), mulch, and acrylic polymer, latex emulsion, or resin in water spray adhesives. All dust control shall be in accordance with 31 20 00 Earthmoving.

PART 3 - EXECUTION

3.01 SURFACE DRAINAGE

A. Maintain and operate adequate surface drainage methods to keep the construction site dry and excavation side slopes and bottom stable such that all construction, as required, can proceed unhindered by saturation and degradation of the area.

B. Surface water shall be controlled so that the stability of excavations and constructed slopes or bottoms are not adversely affected by water, erosion is prevented, and flooding of excavations does not occur.

C. Surface water must be intercepted and drained away from excavations to protect proposed bearing surfaces.

D. Surface water shall not pond on subgrades, in excavations, or on fill.

E. The design and installation of all surface water control features shall be as shown on the Contract Drawings and conform to the NYS Standards and Specifications for Erosion and Sediment Control and the project Erosion and Sediment Control Plan, unless otherwise directed by the Owner's Representative.

3.02 SUBSURFACE DRAINAGE

A. Prevent groundwater from flowing into excavations and trenches and from flooding prepared subgrades and excavations.

B. Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.

C. All pumps and water removal methods shall be designed, installed, and operated in a manner that does not result in loss of ground or removal of fines during operation. Should loss of fines be noted, water removal shall cease immediately and the Owner's Representative notified. The Contractor shall modify the water removal methods as necessary to eliminate further loss of ground, and shall repair any such loss of ground to the satisfaction of the Owner's Representative.

3.03 DISPOSAL OF SURFACE WATER and GROUNDWATER

A. Develop plans to properly collect and discharge surface water and groundwater.

B. Dispose of all water removed from the excavation and site in a manner that will not endanger public health, property or portions of the work under construction or completed. Dispose of water properly and in a manner that will not inconvenience others engaged in work at the site and/or adjacent property owners. Dispose of water in conformance with the NYS Standards and Specifications for Erosion and Sediment Control, and the project Erosion and Sediment Control Plans.

C. All water removed from excavations shall be conveyed in closed conduits or pipes, to appropriate discharge locations. Trenches or other excavations shall not be used for temporary drainage ditches for removal of accumulated surface water.

D. Provide and maintain appropriate erosion and sediment controls in accordance with the NYS Standards and Specifications for Erosion and Sediment Control, and the project Erosion and Sediment Control Plans, and as directed by the Owner's Representative.

3.04 RESTORATION

A. Remove and restore all temporary drainage devices, ditches, sumps, catch basins and drainage piping when no longer needed. All restoration shall be completed to the satisfaction of the Owner's Representative and all costs shall be included as part of the base bid.

END OF SECTION

SECTION 31 23 23

TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Trenching for utilities outside the building to utility main connections.

B. Backfilling for underground utilities.

1.02 RELATED REQUIREMENTS

A. Section 01 57 13 - Temporary Erosion and Sedimentation Control: Slope protection and erosion control.

B. Section 01 70 00 - Execution Requirements: General requirements for dewatering of excavations and water control.

C. Section 31 50 00 - Excavation support and protection.

D. Section 31 20 00 - Earthmoving: Soil removal from surface of site, grading, filling, and compacting.

1.03 SUMMARY

A. This section pertains to excavating and backfilling of underground utilities. The Contractor shall verify the location of all existing utilities prior to excavating for new work by contacting Dig Safe NY (811), and by coordinating with the Owner's Representative.

B. The Contractor shall excavate, protect and backfill all trenches that may be necessary for completing the work to be done under this contract as specified herein and on the Contract Drawings. All excavations shall be in open trenches, except where and to such extent as the Owner may authorize or require that the same be done by tunneling, boring or jacking. Trenches may be in general excavated or backfilled either by machinery or by hand as the Contractor may elect; provided, however, that the Owner shall be empowered, wherever he/she shall decide that such necessity exists, to require that hand excavation be employed and that backfilling by hand shall be done to the extent required at no additional cost to the Owner.

C. The Contractor shall perform all excavation of every description and of whatever substance encountered, to the depths indicated on the Contract Drawings, as specified herein, or as required by the Owner. All excavated material not required for backfill shall be removed and wasted or otherwise disposed of as required or specified.

D. Excavation support methods as specified in Section 31 50 00, shall be designed by a Professional Engineer licensed to practice engineering in New York State.

1.04 DEFINITIONS

A. Excavation shall be classified as follows:

1. Earth Trench Excavation- The removal to required elevations of all clay, silt, loam, sand, gravel hardpan, pavements of all kinds, loose stone and all boulders measuring less than one (1) cubic yard in volume.

2. Rock Trench Excavation- The removal of ledge rock, mass concrete structures and boulders measuring more than one (1) cubic yard in volume.

B. Excavation

1. All procedures and requirements of Section 31 20 00 Earthmoving shall be applicable for trench excavation and protection of bearing surfaces.

2. Underpin or otherwise support in a suitable manner, adjacent structures which may be damaged by excavating work, including utilities and pipe chases.

3. Excavate to accommodate new structures and construction operations.

4. Notify Owner's Representative or Owner of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

5. Work shall be scheduled so the deepest elements are completed first when undermining of shallower elements could occur.

6. Excavation cuts shall be sloped sufficiently to prevent material from sliding into the excavation and to comply with local, state, and Federal codes and regulations. Sheeting and bracing shall be placed as conditions warrant per OSHA Standards.

7. Materials shall not be placed adjacent to the sides of open excavations within a distance equal to two times the maximum depth of the excavation. Stockpiling material over the existing utilities, structures, sewers, force mains or water lines shall not be permitted

8. Excavation shall not continue in trenches where standing water is observed in the work area.

9. Cut utility trenches wide enough to allow inspection of installed utilities.

10. The bottom of excavations shall be protected from frost action and surface drainage. Frozen material shall be removed and replaced with granular fill or concrete.

11. All rock surfaces shall be level and cleaned of loose material. Depressions or cracks in rock shall be square cut and filled with concrete. Over excavation shall be filled with concrete at no additional cost to the Owner.

12. Correct areas that are over-excavated and load-bearing surfaces that are disturbed.

13. Remove excavated material that is unsuitable for re-use from site.

14. Remove excess excavated material from site.

1.05 EXCAVATION LIMITS

A. The Contractor shall provide temporary sheeting, bracing, shoring or trenches as necessary to protect adjacent structures and provide safe working conditions.

B. Rock and boulders shall be removed to provide a clearance of six inches (6-in.) below and one foot (1-ft.) on each side of all pipes.

C. Limits of trench excavation shall be as shown on the applicable trench details given on the Contract Drawings. Unstable and/or unsuitable soils revealed at the trench bottom shall be removed and replaced with specified material as direct by the Owner's Representative.

1.06 REMOVAL AND STORAGE OF MATERIALS

A. In the event more material is excavated from any trench than can be backfilled over the completed pipe or can be stored within the project limits leaving space for drainage, the excess material shall be removed to some convenient place, provided by the Contractor. The Contractor shall bring back as much of the material so removed as may be required to properly backfill the trench, if of the proper kind; or if so required, the Contractor shall furnish such other suitable materials as may be necessary, as part of its base bid.

B. When it is necessary to haul soft or wet materials over the roads, the Contractor shall provide suitable tight vehicles to prevent spillage.

C. All topsoil shall be removed from the limits of trenches before the commencement of trench excavation. After the trenches are backfilled, the topsoil shall be replaced. No additional compensation will be made to the Contractor for this removal and replacement of topsoil. No topsoil shall be removed from the site.

PART 2 - PRODUCTS

2.01 FILL AND BACKFILL MATERIALS

A. Materials required for backfilling shall be as specified in Section 31 20 00 - Earthmoving and as shown on the Contract Drawings, unless otherwise directed by the Owner's Representative.

B. Material testing requirements for bedding and backfill shall be as specified in Section 31 20 00; Earthmoving. The Owner's Representative reserves the right to inspect proposed sources of off-site material and to order such tests of the material deemed necessary to ascertain its quality and gradation of particle size. If similar tests of the material from a particular source were performed previously, the Contractor may submit results of these tests to the Owner's Representative for consideration.

C. No backfill material shall be used on this project until approval is obtained from the Owner's Representative and only material from approved sources shall be used.

PART 3 - EXECUTION

3.01 PIPE BACKFILL REQUIREMENTS

A. Trenches shall be backfilled immediately after installing the pipe. The pipe laying operation may be held up by the Owner's Representative if the backfill operation does not follow immediately.

B. Bedding and Backfill Around Pipe

1. All pipe beds shall be hand shaped and of the material as shown on the detail sheet.

2. When conditions warrant, bedding material shall be used within rock, unstable trench bottom conditions, and areas of over excavation.

3. Bedding material shall be deposited up to the springline of the pipe, completely encasing the lower half of the pipe. The material shall then be thoroughly hand compacted to the specified density out to the side of the trench wall.

4. Bedding and backfill shall be placed in maximum loose lift thicknesses of 6-inches where the use of hand compaction equipment is necessary. Lifts shall be placed in nearly horizontal orientation.

C. Trench Backfill and Maintenance

1. Backfill material shall be deposited in nine-inch (9-inch) maximum lifts and thoroughly compacted to the densities as specified. Lifts shall be placed in nearly horizontal orientation.

2. It is important that the trench is relatively dry during the backfill operation and that the trench be backfilled immediately after installation and backfill around the pipe is completed. The method of consolidation shall be dependent upon the type of backfill material and the finished ground surface above the trench.

D. Special Backfill Requirements

1. Where existing utilities are exposed during construction, the Owner's Representative may require that a timber or steel beam be installed under the exposed line with both ends set on undisturbed ground and intermediate supports and blocking set as directed.

3.02 COMPACTION AND TESTING

A. Backfill shall be compacted in accordance with Section 31 20 00 - Earthmoving.

B. Quality control testing shall be in accordance with Section 31 20 00 - Earthmoving.

3.03 WASTE MATERIAL DISPOSAL

A. Excess excavated material, debris, waste construction materials shall be properly disposed of. The Contractor shall transport and dispose of all excess material at an approved site and shall be responsible for all transportation and disposal costs.

3.04 SITE GRADING

A. Unless otherwise indicated on the plans, the construction site shall be returned to original ground surface elevations or the grades shown on the Contract Drawings.

B. Lawn areas disturbed shall be backfilled to within the specified distance of the original grade and filled the remainder of the way with topsoil, previously stockpiled from the area or imported from an approved source.

C. Seeding and final site restoration shall be in accordance with the Contract Drawings and section 32 92 19 - Seeding.

END OF SECTION

SECTION 31 50 00

EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements for safety for workers and public.

B. Guidelines for excavation safety.

1.02 RELATED REQUIREMENTS

A. Section 31 23 23 – Trenching and Backfilling.

B. Section 31 20 00 - Earthmoving.

1.03 SUMMARY

A. This section specifies requirements for the Contractor's activities such that they provide for the safety of workers and the public. All activities shall be conducted in accordance with pertinent OSHA regulations and the Contractor shall observe all applicable local, state and federal requirements and acquire all necessary permits.

B. The Contractor shall bench or cut back excavated slopes, dewater and sheet, as necessary for stability, safety and protection of adjacent properties, utilities and structures.

C. Sheeting, where utilized, shall be in conformance with pertinent OSHA Regulations to protect employees and to satisfactorily complete the work without causing subsidence and to prevent damage to adjacent ground and structures. If removal of temporary sheeting can potentially damage the existing appurtenances and structures, and/or the new construction, the sheeting and bracing as necessary, must remain in-place permanently.

D. These requirements are minimum standards and shall be increased as necessary depending on the hazard or if directed by the Owner's Representative..

1.04 DESIGN CRITERIA

A. The Contractor shall be responsible for the design of all excavation support systems, regardless of review of the plans or methods of construction, by the Owner's Representative. The Contractor shall design and construct support systems in accordance with the following criteria:

1. Design of excavation support shall be made by a Registered Engineer licensed in the State of New York and experienced in the design of earth support systems. The Contractor shall submit sheeting and bracing plans bearing the stamp of the Professional Engineer for review by the Owner's Representative.

2. Each member shall be designed with a proper factor of safety to support the maximum loads that can occur during construction including all potential live loads and surcharge loads.

3. Carry the bottom of the support system to a depth below the main earth excavation adequate to resist design soil pressures. The design shall account for potential undercutting of the excavation bottom due to the presence of unsuitable subgrade soils.

1.05 SUBMITTALS

A. General: Submittals shall be made according to the conditions of the Contract and Division 01 Specifications Sections.

B. Working Drawings:

1. Submit Excavation Support System working Drawings in accordance with the requirements of Division 01 and the Agreement.

2. Include the following on the Drawings:
   a. Details, arrangement and method of construction of the proposed system.
   b. The method of preloading, if required and bracing.
   c. The elevation of struts and shores, as applicable, and permissible depth to which excavation may be carried before such supports are installed and preloaded.
   d. The full excavation depths, the depths below the main excavation to which the support system will be installed and the maximum design load to be carried by the various members of the support system, and preloads.
   e. Design calculations including references to design methods used, assumptions, design parameters, material properties, allowable stresses and other pertinent information.
   f. Excavation support system deflection tolerances and monitoring requirements.

PART 2 – PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of earth support systems shall be performed without causing damage to adjacent ground, structures and utilities.

B. If unstable material is encountered during excavation, suitable measures must be taken to contain it in place and prevent ground displacement, which may cause damage.

C. Do not continue excavation in running ground. Implement proper dewatering procedures prior to continued excavation. Employ a positive means of containing the material behind the excavation support system, if present, before excavation continues.

D. Materials shall not be placed adjacent to the sides of sheeted or open excavations within a distance equal to two times the maximum depth of the excavation. Stockpiling material over the existing utilities, structures, sewers, force mains or water lines shall not be permitted.

3.02 REMOVAL AND RESTORATION

A. The removal of the support system shall be done in a manner such that the constructed structure remains undisturbed and that no disturbance or damage shall occur to adjacent structures, utilities, or other appurtenances. If removal of temporary support system may potentially damage adjacent features, then the support system must remain permanently.

B. If soil is retained on the temporary support elements during removal, the extraction and removal shall be terminated such that overlying structures and features are not damaged.

C. Support systems left in place shall be cutoff at least 3-feet below adjacent finished grades, and as directed by the Owner's Representative.

D. The Contractor shall repair all damage to property resulting from installation or removal of the support system at no additional cost to the Owner.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 32 05 19.13

GEOTEXTILES FOR EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section specifies the material and construction requirements for geotextiles.

1.02 RELATED REQUIREMENTS

A. Site Preparation, Section 31 10 00;

B. Earthmoving, Section 31 20 00;

C. Dewatering, Section 31 23 19.

1.03 SUBMITTALS

A. Contractor shall submit proposed geo-textile fabric product data, including manufactures name, material specifications, and installation instructions. The Contractor shall also furnish a manufacturer's certificate stating that the material supplied conforms to the specifications.

B. General: Submittals shall be made according to the conditions of the Contract and Division 1 Specifications Sections.

1.04 DELIVERY, STORAGE AND HANDLING

A. Geo-textiles shall be provided in rolls wrapped with protective covering to protect the fabric from sunlight, mud, dirt, dust, debris during transport and storage. The fabric shall be free of defects or flaws which significantly affect its physical properties. Each roll of fabric in the shipment shall be labeled with a number or symbol to identify the production run.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Geo-textile fabrics shall meet the requirements specified in the NYSDOT Materials Bureau most current Approved List, as specified below:

1. Geo-textile fabric for undercut (UC) shall consist of a woven, polypropylene fabric as listed in the NYSDOT Approved List.

2. Woven geo-textile shall meet NYSDOT Strength Code No. 1. Acceptable products include US 270 by US Fabrics, WINfab 270W by WINFab, Mirafi 550X by Tencate, or approved equal.

3. Non-woven Stabilization/Drainage geotextile shall meet NYSDOT Strength Code No. 1. Acceptable products include US 180NW by US Fabrics; WIN Fab 1200N by WINFab, Mirafi 180N by Tencate.; or accepted equivalent.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The following provision shall apply, except where in conflict with the manufacturer's recommendations.

B. Geo-textile shall be installed at the location shown on the Drawings. Geo-textile fabrics shall be installed in accordance with: the procedures of NYSDOT §207-Geotextile; as shown on the Drawings; and the manufacturer's recommendations.

C. Geo-textile may be joined by either sewing or overlapping as per the manufacturer's recommendations but, end and side laps shall not be less than 12-inches.

D. The methods and materials for seaming or overlapping shall be subject to the approval of the Owner's Representative.

E. Traffic or construction equipment will not be permitted on the geo-textile.

F. The geo-textiles shall be placed and anchored on a prepared surface approved by the Owner's Representative. The fabric shall be laid loosely so that placement of the overlying materials shall not stretch or tear the geo-textile.

G. At the time of installation, geo-textile shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage.

H. The fabric shall be protected at all times during construction from damage resulting from sunlight, excessive surface water, construction traffic, improper installation procedures, or any other condition which can result in damage to the fabric. Geo-textile found to be damaged as a result of improper construction procedures or inadequate protection, shall be replaced by the Contractor at no cost to the Owner.

END OF SECTION

SECTION 32 10 00

AGGREGATE BASES AND PAVEMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

B. Paving aggregates.

C. Bituminous Paving.

1.02 RELATED REQUIREMENTS

A. Section 31 20 00 - Earthmoving: Preparation of site for base course.

B. Section 31 23 23 - Trenching and Backfilling: Compacted fill over utility trenches under base course.

C. Section 31 20 00 - Earthmoving: Topsoil fill at areas adjacent to aggregate base course.

D. Section 31 20 00 - Earthmoving: Compacted fill under base course.

E. Section 33 05 13 - Manholes and Structures: Manholes including frames.

1.03 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, and services necessary to install asphalt concrete pavement and subbase as shown on the Contract Drawings and as specified herein.

B. Pavement and subbase shall be placed to the lines, grades, thicknesses and configurations shown on the Contract Drawings.

1.04 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; American Association of State Highway and Transportation Officials; 1965 (2004).

B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2010

C. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.

D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3); 2012.

E. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

G. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

H. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

I. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

J. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2010.

K. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

L. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; The Asphalt Institute; 1997.

M. AI MS-19 - A Basic Asphalt Emulsion Manual; The Asphalt Institute; Fourth Edition.

N. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 2009a.

1.05 SUBMITTALS

A. General: Submittals shall be made according to the conditions of the Contract and Division 01 Specifications Sections.

B. The Contractor shall submit the name of the asphalt concrete supplier. The Supplier shall be a plant currently approved by the New York State Department of Transportation (NYSDOT).

C. The Contractor shall submit certification(s) from the asphalt concrete supplier that the asphalt concrete materials are in compliance with the referenced NYSDOT Standard Specifications.

D. The Contractor shall submit a list of equipment, off-site material sources, and test data showing that proposed subbase material source(s) meet the specified requirements, earthwork procedures, material handling and stockpiling procedures and locations, material placement procedures and quality control plans as required by the Owner's Representative. Samples of subbase materials shall be provided to the Owner's Representative as directed.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When aggregate materials need to be stored on site, locate where indicated on drawings.

C. When aggregate materials need to be stored on site, locate where directed by Owner.

D. Aggregate Storage, General:

1. Separate differing materials with dividers or stockpile separately to prevent intermixing.

2. Prevent contamination.

3. Protect stockpiles from erosion and deterioration of materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Subbase Type 2: Subbase Type 2 shall meet the requirements of NYSDOT §304-Type 2 and conform to the requirements as set forth in specification section 31 20 00 - Earthmoving.

B. Asphalt Concrete Base: Asphalt concrete base shall be dense with relatively low permeability and meet all requirements of NYSDOT §401. The composition of the bituminous plant mixture is Base Type 1 NYSDOT meeting the following gradation requirements:

Sieve Size	**Percent Passing**
2-inch	100
1 ½-inch	90-100
1-inch	78-95 (+/- 5)
½ -inch	57-84 (+/- 6)
¼ -inch	40-72 (+/- 7)
1/8 -inch	26-57 (+/- 7)
No. 20	12-36 (+/- 7)
No. 40	8-25 (+/- 7)
No. 80	4-16 (+/- 4)
No. 200	2-8 (+/- 2)
Asphalt Content	4.0-6.0 (+/- 0.4)

C. Asphalt Concrete Binder: Asphalt concrete binder shall be dense intermediate course with a relatively low permeability and meet all requirements of NYSDOT §702. The composition of the bituminous plant mixture is Type 3 Binder PG64-28 - NYSDOT meeting the following gradation requirements:

Sieve Size	**Percent Passing**
1 ½-inch	100
1-inch	95-100

½ -inch	70-90 (+/- 6)
¼ -inch	48-74 (+/- 7)
1/8 -inch	32-62 (+/- 7)
No. 20	15-39 (+/- 7)
No. 40	8-27 (+/- 7)
No. 80	4-16 (+/- 4)
No. 200	2-8 (+/- 2)
Asphalt Content	4.5-6.5 (+/- 0.4)

D. Asphalt Concrete Top: Asphalt concrete top shall be a dense smooth gritty texture which meets the requirements of NYSDOT §401. The composition of the bituminous plant mixture is Top Type 7 meeting the following gradation.

Sieve Size	**Percent Passing**
½ -inch	100
¼ -inch	90-100
1/8 -inch	45-70 (+/- 6)
No. 20	15-40 (+/- 7)
No. 40	8-27 (+/- 7)
No. 80	4-16 (+/- 4)
No. 200	2-6 (+/- 2)
Asphalt Content	6.0-8.0 (+/- 0.4)

E. Asphalt Tack Coat: Asphalt tack coat shall consist of asphalt emulsion which meets the requirements of NYSDOT §702-6 (Table 702-9) Item 407.0101, Grade HFMA-2H.

F. Asphalt Joint Filler/Sealer shall consist of liquid asphalt that meets the requirements of NYSDOT §702-0700, Asphalt Filler. Pre-molded bituminous filler shall conform to NYSDOT specifications section 705-07.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.

B. Provide materials of each type from same source throughout the Work.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Perform excavation in accordance with Section 31 10 00 - Site Preparation; and Section 31 20 00 - Earthmoving.

3.02 SUBGRADE PREPARATION

A. Subgrades in which soft or unsuitable materials are encountered that are not a result of Contractor's operations or failure to protect subgrades shall be undercut and backfilled with granular subbase as directed by the Owner’s Representative.

B. All subgrades will be monitored and tested as determined necessary by the Owner's Representative. The Contractor shall proof roll subgrades in accordance with Section 31 20 00 - Earthmoving. All proof rolling shall be done in the presence of the Owner's Representative. Areas which are determined to be soft, wet and/or unstable shall be undercut and/or stabilization fabric or geo-grid placed as directed by the Owner's Representative. Fill materials placed in undercut areas or immediately over stabilization fabric or geo-grid shall be granular subbase as directed by the Owner's Representative and in accordance with Section 31 20 00 - Earthmoving.

C. The Contractor shall place no materials or fill until the subgrades are observed and tested as directed by the Owner's Representative.

3.03 PAVEMENT CONSTRUCTION

A. The Contractor shall not place subbase fill or place asphalt concrete until underlying subgrades have been observed and tested as directed by the Owner's Representative.

B. The materials shall be placed at the locations and to the lines and grades, and thicknesses shown on the Contract Drawings.

C. Placement and Compaction:

1. Subbase
   a. Refer to Section 31 20 00 - Earthmoving.

2. Asphalt Concrete Base
   a. Asphalt Concrete Base shall be constructed on a prepared subbase in accordance with the requirements of NYSDOT §404 and in conformity with the required lines, grades, thickness and typical sections shown and specified herein or as directed by the Owner's Representative.

3. Asphalt Concrete Binder
   a. Asphalt Concrete Binder shall be constructed over the completed asphalt base in accordance with the requirements of NYSDOT §404 and in conformity with the required lines, grades, thickness and typical sections shown and specified herein or as directed by the Owner's Representative.

4. Asphalt Concrete Top
   a. Asphalt Concrete Top shall be constructed over the completed asphalt binder course in accordance with the requirements of NYSDOT §404 and in conformity with the required lines, grades, thickness and typical sections shown and specified herein or as directed by the Owner's Representative.

5. Asphalt Emulsion Tack Coat
   a. Asphalt Emulsion Tack Coat shall be placed in accordance with NYSDOT Standard Specifications 702-8. Asphalt Emulsion Tack Coat shall be placed at the locations shown on the Contract Drawings and in accordance with the requirements of NYSDOT §407 Tack Coat.

6. Asphalt Joint Filler
   a. Asphalt Joint Filler shall be placed in accordance with the requirements of NYSDOT §633 Conditioning of Pavement.

7. Joints
   a. Joints shall be constructed in accordance with the requirements of NYSDOT §404-3.09 Joints.

D. Frozen or Unsuitable Subgrades: Fill materials and asphalt concrete shall not be placed over frozen, wet, or unsuitable subgrades.

3. 04 FIELD QUALITY CONTROL

A. General: Comply with NYSDOT Standard Specifications 401 and 404 for asphalt types specified.

B. Portions of completed pavement that are defective in finish, compaction or elevation, or that do not comply in all respects with the requirements of the contract documents, shall be taken up, removed and replaced with suitable material, and properly installed in accordance with the contract documents, at No Cost to the Owner.

C. Thickness and Density: In-place compacted thickness will not be acceptable when it is less than 95% of the total shown on the drawings.

D. Joints: Ensure the finished pavement at all joints complies with the surface tolerance requirements and exhibits the same uniformity of texture and compaction as other sections of the pavement course. Do not pass rollers over the unprotected edges of freshly laid mixtures unless approved by the Owner's Representative.

E. Surface Smoothness: The finished asphalt surfaces shall be uniform and without ruts or visible irregularities, as determined by the Owner's Representative. The Contractor shall repair any areas that settle or otherwise do not meet the standards for surface smoothness as directed by the Owner's Representative, and at no cost to the Owner. Each course shall be tested for surface smoothness using a 10-ft straight edge applied parallel with, and at right angles to the centerline of paved areas. Surfaces will not be accepted when exceeding the following tolerances for smoothness and shall be entirely removed and brought to proper grade and repaired, to the satisfaction of the Owner's Representative.

1. For Asphalt Concrete:
   a. Base Course Surface: 3/8-in.
   b. Binder Course Surface: 1/4-in.
   c. Wearing Course Surface: 1/8-in.

F. Check the surface grades and drainage patterns. Small ponding areas (bird baths) larger than two (2') feet in any dimension are not acceptable. When this test proves that surface conditions are not acceptable, the Contractor will be responsible for correcting the problems, at no additional cost to the Owner.

G. All pavement shall be warranted as to workmanship and materials for the period of one-year following final acceptance of the entire project. Any change of acceptance date shall be executed and administered, in writing, by the Owner's Representative.

H. Visual inspection of the subgrades will be performed by the Owner's Representative. If "soft" spots are identified, the Contractor shall remove them as directed by the Owner's Representative and be reimbursed based on Unit Cost. Compaction testing may be required by the Owner's Representative to ascertain the compacted density of the subgrade prior to allowing placement of subbase. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and retested. Subbase may then be applied in accordance with Section 31 20 00 - Earthmoving. Finished subbase surfaces shall be uniform and without ruts or visible irregularities, as determined by the Owner's Representative. Subbase not installed to the lines and grades specified shall be repaired by the Contractor at no additional cost to the Owner.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, stair steps, integral curbs, gutters, and median barriers.

1.02 RELATED REQUIREMENTS

A. Section 32 13 73 - Joint Sealants: Sealing joints.

B. Section 31 20 00 - Earthmoving: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.

1.03 PRICE AND PAYMENT PROCEDURES

A. Concrete Pavement Mix (Wearing Course): Measurement by the cubic yard. Includes mix design, supplying to site, testing.

B. Concrete Placed: Measurement by the square yd. per inch thickness. Includes preparing base, placing, floating and finishing, testing.

1.04 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2009).

B. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010 (Errata 2012).

C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.

D. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 2010.

E. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 2010.

F. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

G. ASTM A497/A497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2007.

H. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2015.

I. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

J. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

K. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2014.

L. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.

M. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.

N. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

O. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

P. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2012.

Q. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.

R. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

S. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data:

1. Concrete Design Mix: Submit proposed concrete design mix together with name and location of batching plant at least 28-days prior to the start of concrete work.

2. Portland Cement: Brand and Manufacturer’s name.

3. Air-entraining Admixture: Brand and manufacturer’s name.

4. Water-reducing or High Range Water-reducing Admixture: Brand and manufacturer’s name.

5. Curing and Anti-Spalling Compound: Manufacturer's specifications and application instructions.

6. Joint Filler

C. Samples: Fabric Reinforcement: Two square feet.

D. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

PART 2 - PRODUCTS

2.01 PAVING ASSEMBLIES

A. Comply with applicable requirements of ACI 301.

B. Design paving for walkways and steps.

C. Concrete Sidewalks, Steps and Median Barrier: 5,000 psi 28 day concrete, 6-inches thick, Natural Grey color Portland cement, light broom finish.

2.02 FORM MATERIALS

A. Form Materials: Conform to ACI 301.

B. Forms:

1. Forms shall be well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
   a. Plywood: Sound, undamaged sheets with straight edges. Minimum thickness of 3/4-inch, U.S. Product Standard PS-1 B-B plyform or HDO plyform.
   b. Lumber: Stamp clearly visible, indicating species and grade.
   c. Steel: Minimum 16-gauge.
   d. Metal Frame and Plywood Face Combination: 5/8-inch facing.

2. Unexposed Concrete: Form concrete surfaces that will be unexposed in finished structure with plywood, lumber, metal or other acceptable materials. Provide lumber dressed on at least two edges and one side for tight fit.

3. Chamfer Strips: 1/2-inch, 45 degree prefabricated extruded "PVC" or milled poplar wood strips, nailed 6-inches on center, and installed in inside corners of all forms.

4. Ties for foundation walls shall be snap-ties with removal cones and shall incorporate water seal washer. Ties shall be arranged in a symmetrical manner.

5. Form Coatings/Release Agents: Provide VOC compliant, non-bonding, non-staining commercial formulation form coating compounds.

C. Joint Filler: Preformed; non-extruding bituminous type ASTM D1751.

1. Thickness: 1/2-inch.

2. Product: In accordance with NYSDOT Specification Section 705.

2.03 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, Grade 60 (60,000) psi yield strength; deformed billet steel bars; unfinished.

B. Steel Welded Wire Reinforcement: Plain type, W2.9 x W2.9 ASTM A185; in flat sheets of 6 x 6; unfinished.

C. Dowels: ASTM A615, Grade 40 - 40,000 psi yield strength; deformed billet steel bars; unfinished finish.

2.04 CONCRETE MATERIALS

A. Obtain cementitious materials from same source throughout.

B. Concrete Materials: Provide in accordance with NYSDOT standard specifications. Normal weight, air-entrained concrete with minimum compressive strength of 5,000 psi at the end of 28-days.

C. Cement: ASTM C150 Normal - Type I Portland type, grey color, Minimum 6.5 bags or 611 pounds per cubic yard.

D. Fine and Coarse Mix Aggregates: ASTM C33.

1. Course aggregate shall be stone meeting the requirements of NYSDOT 501-2.02 and have the following gradation requirements:

Sieve Size	Percent Finer by Weight
1 1/2-inch	100
1-inch	93-100
1/2-inch	27-58
1/4-inch	0-8

E. Water: Potable, clean, and not detrimental to concrete.

F. Design Air Content: ASTM C260, and on NYSDOT current “Approved List”; 6 percent by volume plus or minus 1.5 percent.

G. Air-Entraining Admixtures: ASTM C260.

H. Slump: Between 2 and 4-inches; except when a water-reducing admixture is used, maximum slump shall be 6-inches. And when a high range water reducing admixture is used, maximum slump shall be 8-inches.

I. Chemical Admixtures: ASTM C494 and on the NYSDOT current "Approved Lists", Type A - Water Reducing, and Type F - Water Reducing, High Range and Retarding.

1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

J. Chemical Curing and Anti-Spalling Compound: ASTM C-309, Type 1D, Class B, Clear, styrene acrylate type liquid compound with fugitive dye, minimum 18 percent total solids (by weight of compound), ready for use by spray apparatus.

1. VOCOMP 20 by W.R. Meadows, Inc.; wrmeadows.com; (800) 342-5976.

2. Spray Cure & Seal 25A. by ChemMasters, Inc.; chemmasters.net, (440) 428-2105.

3. Lin-Seal by W.R. Meadows, Inc.; wrmeadows.com; (800) 342-5976.

4. Silencure-A (J-22) by by ChemMasters, Inc.; chemmasters.net, (440) 428-2105.

5. Acrylseal HS by Master Builders, Inc., 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

2.05 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. Prepare subbase in accordance with Section 31 20 00 - Earthmoving.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole frames with oil to prevent bond with concrete pavement.

C. Notify Owner's Representative minimum 24-hours prior to commencement of concreting operations.

3.04 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Space expansion joints equally at not more than 40-ft on center unless otherwise indicated on plans.

D. Place joint filler vertical in position, in straight lines, where new concrete abuts existing concrete paving and at fixed structures or appurtenances. Secure to formwork during concrete placement. Protect the top edge of the joint filler during concrete placement with a temporary cap and remove after concrete has been placed.

3.05 REINFORCEMENT

A. Prior to placement, clean reinforcement thoroughly of mill and rust scale and of coatings which could destroy or reduce bond.

B. Install fabric reinforcement midway between the top and bottom of the concrete slab. To ensure the final location of reinforcement at the mid-slab location:

1. Prior to placing concrete, place fabric reinforcement midway between top and bottom of the slab and secure against displacement with the use of chair carriers, or other approved materials.

C. Lap edges and ends of adjoining sheets of fabric reinforcement at least half the mesh width. Offset end laps in adjacent sheets to prevent continuous joints at ends. Interrupt reinforcement at expansion joints, stopping 2-inches from edges.

D. Place other reinforcement as indicated.

E. Interrupt reinforcement at contraction joints.

F. Place dowels to achieve pavement and curb alignment as detailed.

3.06 COLD AND HOT WEATHER CONCRETING

A. Follow recommendations of ACI 305R when concreting during hot weather.

B. Follow recommendations of ACI 306R when concreting during cold weather.

C. Do not place concrete when base surface temperature is less than 40-degrees F, or surface is wet or frozen.

3.07 PLACING CONCRETE

A. Place concrete in accordance with NYSDOT standards.

B. Do not place concrete when base surface is wet.

C. Place concrete using the slip form technique.

D. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.

E. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

F. Consolidate concrete by spading, rodding, forking, or using an approved vibrator eliminating all air pockets, stone pockets, and honeycombing. Work and float concrete surface so as to produce a uniform texture.

G. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

3.08 JOINTS

A. Align curb, gutter, and sidewalk joints.

B. Place 3/8-inch wide expansion joints at 20-foot average (40-ft maximum) intervals and to separate paving from vertical surfaces and other components and in pattern indicated.

1. Form joints with joint filler extending from bottom of pavement to within 1/2-inch of finished surface.

2. Secure to resist movement by wet concrete.

C. Provide scored joints.

1. At between 5-feet to 8-feet intervals. (See plans.)

2. Between sidewalks and curbs.

3. Between curbs and pavement.

D. Provide keyed joints as indicated.

E. Saw cut contraction joints 3/16-inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.10 FINISHING

A. Area Paving: Light broom, texture perpendicular to pavement direction.

B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/2-inch radius.

C. Median Barrier: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/2-inch radius.

D. Curbs: Light broom, texture parallel to pavement direction.

E. Place sealer on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.11 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4-inch in 10-ft.

B. Maximum Variation From True Position: 1/4-inch.

3.12 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

1. Provide free access to concrete operations at project site and cooperate with appointed firm.

2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.

1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

2. Perform one slump test for each set of test cylinders taken.

C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.13 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian traffic over pavement for 7-days minimum after finishing.

C. Do not permit vehicular traffic over pavement until 75 percent design strength of concrete has been achieved.

END OF SECTION

SECTION 32 13 73

CONCRETE PAVING JOINT SEALERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Joint Sealers for Concrete Paving and Walks.

1.02 RELATED REQUIREMENTS

A. Section 32 13 13 – Concrete Paving.

B. Section 32 16 13 – Concrete Curbing.

1.03 SUMMARY

A. Provide joint sealers that have been produced and installed to establish and maintain watertight continuous seals at designated locations.

1.04 QUALITY ASSURANCE

A. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

B. Preconstruction Joint Sealer-Substrate Tests: Submit substrate materials representative of actual joint surfaces to be sealed to manufacturer of joint sealer products for laboratory testing of sealants for adhesion to primed and unprimed substrates and for compatibility with secondary seals, if required, as indicated below:

1. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealers to joint substrates under environmental conditions that will exist during actual installation.

2. Testing will not be required when joint sealer manufacturer is able to submit joint preparation data required above which is acceptable to Architect and is based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates matching those submitted.

C. Preconstruction Field Tests: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:

1. Install joint sealants in 5-feet joint lengths using same materials and methods required for completed work. Allow sealants to cure before testing. Test adhesion to joint substrates by manually trying to pull joint sealant out of joint.

2. Locate test joints where indicated or, if not indicated, as directed by Owner's Representative.

3. Perform field tests for each type of elastomeric sealant and joint substrate application indicated.

4. Perform tests in presence of Owner's Representative.

1.05 SUBMITTALS

A. General: Submittals shall be made according to the conditions of the Contract and Division 01 Specifications Sections.

B. Product Data: Submit manufacturer's technical data for each joint sealer product required, including instructions for joint preparation and joint sealer application.

C. Samples for Initial Selection Purposes: Submit manufacturer's standard bead samples (three sets) consisting of strips of actual products showing full range of colors available, for each product exposed to view.

D. Test Reports: Submit the following test reports:

1. Preconstruction joint sealer-substrate test results including recommendations of joint sealer manufacturer for joint preparation and application of joint sealers applicable to project conditions.

2. Certified test reports for elastomeric sealants evidencing compliance with requirements specified based on comprehensive testing of current product formulations within a 24-month period preceding date of submission of test reports to Owner's Representative. Include test results for aged performances including hardness, stain resistance, adhesion and cohesion under cyclic movement, low-temperature flexibility, modulus of elasticity at 100% strain, effects of heat aging, and effects of accelerated weathering.

E. Certificates from manufacturers of joint sealers attesting that their products comply with specification requirements and are suitable for the use intended.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to project site in original unopened containers or bundles with labels informing about 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 to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.07 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions.

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.

2. When joint substrates are wet due to rain, frost, condensation or other causes.

B. Joint Width Conditions: Do not proceed with installation of joint sealers when joint widths are less than allowed by joint sealer manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

D. Protect all surfaces adjacent to sealants with non-staining removable tape or other approved covering to prevent soiling or staining.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Compatibility: Provide joint sealers, 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 testing and field experience.

B. Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Owner's Representative from manufacturer's standard colors.

2.02 JOINT SEALERS

A. Joint Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.

B. Horizontal Joint Sealant: One-component, cold-applied, self-leveling polyurethane joint sealant. Horizontal joint sealant shall have the following characteristics:

1. ASTM C 920-11: Type S; Grade P; Class 25; Uses T1, T2, NT, O, M and, G.

2. Consistency: Liquid, Self-leveling.

3. Skin Formation Time (74^{o} F – 50% RH): 60-120 minutes.

4. Water and Salt Spray Resistance: Excellent

5. Modulus at Break, ASTM D412: >0.6 MPa.

6. UV Resistance: Good.

7. Resistance to Dilute Acids and Bases: Average

8. Temperature Resistance: -40 – 176^{o} F

9. VOC: 24g/L

10. Non-Bubbling formula; may be applied to green concrete.

C. Vertical Joint Sealant, One-component, non-sag polyurethane joint sealant. Non-sag Joint Sealant shall meet the following: ASTM C920-11, Type S, Grade NS, Class 35, Use T1, T2, NT, O, M, or G.

D. Products: Subject to compliance with requirements, provide one of the following:

1. Horizontal Joint Sealants:
   a. "Pourthane SL", by W.R.Meadows Corp.
   b. "Sikaflex 1cSL", by Sika Corp.
   c. "Eucolastic 1SL", by Euclid Chemical Corp.
   d. "MasterSeal SL1", by BASF Corp.
   e. "955-SL", by Bostik Corp.

2. Vertical Joint Sealants:
   a. "Pourthane SL", by W.R. Meadows Corp.
   b. "Sikadur -51 NS", by Sika Corp.
   c. "Eucolastic 1NS", by Euclid Chemical Corp.
   d. "MasterSeal NP 1", by BASF Corp.

2.03 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint-Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance: Closed-cell polyethylene foam, non-gassing.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back (3rd) surface of joint. Provide self-adhesive tape where applicable.

2.04 MISCELLANEOUS MATERIALS

A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer substrate and field tests.

B. Cleaners for Nonporous Surfaces: provide non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.

C. Masking Tape: Provide non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 INSPECTION

A. Require Installer to inspect joints indicated to receive joint sealers for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Obtain Installer's written report listing any conditions detrimental to performance of joint sealer work. Correct unsatisfactory conditions before joint sealer work proceeds.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements.

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust, dirt, rust, oils, paints, or other foreign matter that will impair the performance of materials installed under this Section; except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer.

2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, mechanical abrading or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming.

3. Remove laitance and form release agents from concrete.

4. Clean metal, glass, porcelain, enamel, glazed surfaces of ceramic tile and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer 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 which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated.

D. 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 which 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 which have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tape between sealants and joint-fillers, compression seals or back of joints where required to prevent third-side adhesion of sealant to back of joint.

3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

E. 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 which allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants:

1. 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 which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

2. Concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.

3.04 PROTECTION AND CLEANING

A. Protect joint sealers 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 deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 33 05 13

MANHOLES AND STRUCTURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Monolithic concrete manholes with masonry transition to lid frame, covers, anchorage, and accessories.

B. Modular precast concrete manhole sections with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage, and accessories.

C. Monolithic FRP manholes with transition to lid frame, covers, anchorage, and accessories.

D. Masonry manhole sections with masonry transition to lid frame, covers, anchorage, and accessories.

1.02 PRICE AND PAYMENT PROCEDURES

A. Manhole: By the unit. Includes excavating, concrete base pad, concrete manhole sections, FRP manhole sections, brick masonry manhole construction, brick masonry transition to cover frame, cover frame and cover, to indicated depth, forming and sealing pipe inlets and outlets.

1.03 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.

B. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2012).

C. ASTM C55 - Standard Specification for Concrete Building Brick; 2011.

D. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2013.

E. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections; 2013.

F. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals; 2008 (Reapproved 2013).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate manhole locations, elevations, piping sizes and elevations of penetrations.

C. Product Data: Provide manhole covers, component construction, features, configuration, and dimensions.

D. Manufacturer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

B. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Mortar shall conform the requirements of NYSDOT §705-22 Portland Cement Mortar for Bonding Grout.

B. Precast Reinforced Concrete Manhole Riser Sections, Catch Basin Riser Sections, Field and Standard Gutter Inlets, and Eccentric Flat Slab Covers shall conform to the requirements of ASTM C478.

C. Joints between Riser Sections shall be tongue and groove with Super 40 Rubber Joint Gaskets that conform to ASTM C443; Bitumastic sealing tape.

D. Manhole bases may be pre-cast or cast in-place.

E. All manholes and catch basins shall be sealed inside completely with two (2)-coats of heavy duty repellant protective coating made of coal tar. Bitumastic coatings shall be applied at the location of manufacture for all pre-cast components. Field coatings shall be applied as directed by the Owner’s Representative to repair damaged coatings.

F. Non-shrink grout shall be in accordance with NYSDOT §701-05 Concrete Grouting Material, or as directed by the Owner’s Representative.

G. Pipe-to-Manhole/Drainage Structure Connections - one of the following:

1. A-Lok Flexible Connector by A-Lok Products, Inc., 697 Main St., Tullytown, PA 19007, (215) 547-3366.

2. Lockjoint Flexible Connector by Chardon Rubber Company, 373 Washington St., Chardon, OH 44024, (216) 285-2161.

3. Kor-N-Seal Flexible Connector by NPC, Inc., 250 Elm St., Milford, NH 03055, (601) 673-8680.

4. Link-Seal Flexible Connector by Thunderline Link-Seal, Inc., 6525 Goforth St., Houston, TX 77021, (713) 747-8819.

5. Cement mortar in accordance with ASTM C270.

H. Cast-in-place concrete for manhole inverts and other system elements shall conform to the requirements of Class A, NYSDOT §501 - Portland Cement Concrete. Concrete shall have a 28-day compressive strength of 4,000 pounds per square inch (psi) or as shown on the Contract Drawings.

I. Bar reinforcement and wire fabric for concrete reinforcement shall conform to the requirements of NYSDOT §709 - Reinforcing Steel. Material sizes and placement requirements shall be as shown on the Contract Drawings.

J. Precast concrete spacers shall conform to the requirements of Class A, NYSDOT §501 - Portland Cement Concrete. Concrete shall have a 28-day compressive strength of 3000 pounds per square inch (psi) or as shown on the Contract Drawings.

K. Brick shall conform to the requirements of NYSDOT §704-01 Common Brick or NYSDOT §704-02 Concrete Brick.

L. Steps shall be provided in manholes and be capable of withstanding a 300 pound concentrated live load without permanent distortion and with rungs a minimum 10-inches wide designed to prevent feet from slipping off the ends. All manhole rungs and steps shall conform to the requirements of NYSDOT §725-02.01 - Steps for manholes. Ferrous metal manhole rungs shall consist of Cast Iron Steps in accordance with Neenah R-1980-1 or approved equal. Reinforced plastic steps shall conform to Steel reinforced co-polymer polypropylene ASTM 2146-82, Type 2, grade 43758,

M. ASTM C478-85A. Non-corrodible aluminum magnesium ladders with intermediate supports at 5-foot intervals on forged aluminum with drop front design and grooved thread surface may also be used.

N. Manhole frames and covers for stormwater sewers shall consist of cast iron frame and cover, Neenah R-1590 or approved equal. Frames and covers shall be heavy duty, suitable for highway traffic HS-20 wheel loads as shown and specified on Contract Drawings, and shall comply with the requirements of NYSDOT §655 – Frames, grates and covers. All solid covers shall bear the word “Storm”, as appropriate.

O. Open grating for standard stormwater inlets (within pavement areas) shall be in accordance with the requirements of NYSDOT §655 – Frames, grates and covers and as specified on the Contract Drawings. Acceptable manufactures include East Jordan Iron Works V-5622 or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

C. Verify excavation for manholes is correct.

3.02 PREPARATION

A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

B. Pipe Openings in Pre-cast Concrete Manhole Riser shall be a groove for the pipe penetration seal that shall be installed when the manhole section is cast.

3.03 MANHOLES

A. Cast-in-place concrete construction shall be in accordance with the requirements of NYSDOT §555 - Structural Concrete.

B. Build structures to the shapes and dimensions shown with pre-cast reinforced riser sections to the dimensions shown on the Contract Drawings. Seal joints between pre-cast riser sections with material specified. Steps shall be installed 12-inches on center from top to bottom and in a manner capable of withstanding a lateral pull of 1,000 pounds, where shown on the Contract Drawings.

C. The base structures shall be placed on the bedding material to the lines and grades specified on the Contract Drawings. The Contractor shall take precautions to avoid cracking or causing other damage to the structure base or riser sections. Any damage done to the base or riser sections shall result in the structures being replaced at the Contractor's own expense.

D. Seal openings around pipe laterals with pipe penetration seals, and non-shrink grout. Protect clamp outside of manhole with minimum 2-inch wide (final applied width) heat shrink tape. Pipe penetration into the manhole shall be at least six (6) inches and no more than ten (10) inches beyond the inside wall of the catch basin at the spring lines of the pipe.

E. Attach mounting Frames and Covers in accordance with manufacturers' recommendations and as shown on the shop Drawings. Provide watertight seal between cover frame and concrete surface of manholes for sanitary and stormwater sewers.

3.04 INSTALLATION OF SEWER PIPES INTO EXISTING MANHOLES

A. Excavation and backfilling shall be as specified in Section 31 23 23.

B. The Contractor shall neatly core existing manholes in such a way as to not damage the structure and allow pipe installation. The core procedure shall be submitted to the Owner's Representative for review.

C. The existing manhole shall be repaired after installation of the new pipe. The manhole repair shall be made with non-shrink cement-based grout.

D. Repaired manholes shall not be backfilled until the concrete has achieved the specified strengths.

E. Pavement around the manhole shall be repaired as specified in Section 32 10 00 and as shown on the Contract Drawings.

3.05 MASONRY WORK

A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

B. Lay masonry units in running bond. Course one unit and one mortar joint to equal 8 inches.

C. Form concave mortar joints.

D. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

E. Install joint reinforcement 16-inches on center.

F. Place joint reinforcement in first and second horizontal joints above base pad and below lid frame opening.

3.06 SCHEDULES

A. Storm Sewer Manholes: Precast concrete sections, galvanized steel steps, 48-inch inside dimension, to depth indicated, with bolted lid.

END OF SECTION

SECTION 33 11 16

SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe and fittings for site water lines including domestic water lines and fire water lines.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete for thrust restraints.
B. Section 31 23 23 - Excavation: Excavating of trenches.
C. Section 31 23 23 - Trenching: Excavating, bedding, and backfilling.
D. Section 31 23 23 - Fill: Bedding and backfilling.
E. Section 33 13 00 - Disinfecting of Water Utility Distribution: Disinfection of site service utility water piping.

1.3 PRICE AND PAYMENT PROCEDURES

A. Pipe and Fittings: By the linear foot. Includes hand trimming excavation, pipe and fittings, bedding, concrete thrust restraints, connection to building service piping, and to municipal utility water source.

1.4 REFERENCES

A. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings; American Water Works Association; 2008 (ANSI/AWWA C104/A21.4).
B. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; 2012 (ANSI/AWWA C111/A21.11).
C. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges; 2011.
D. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; American Water Works Association; 2009 (ANSI/AWWA C151/A21.51).

1.5 GENERAL REQUIREMENTS FOR WATER MAINS

A. The pipe and accessories shall be new and unused. The interior of the pipe shall be visually inspected and thoroughly cleaned of foreign matter before being placed in the trench, and shall be kept clean during placing operations by plugging or other approved methods. The full length of each section of pipe shall rest solidly upon the pipe bed, with recesses excavated to accommodate bells and joints. Any pipe that has the grade or joint disturbed after laying shall be taken up and re-laid. Pipe shall not be laid in water, or when trench or weather conditions are not suitable for the work, except by permission of the Engineer. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth, or other substances will enter the pipes or fittings. Any sections of pipe found to be defective before or after placing, shall be replaced with sound pipe without additional expense to the Owner. In addition to concrete thrust blocks, fittings at bends in pipe line shall be restrained using specified restraint glands and restraint joints as per restrained length calculations using megalugs or uniflange friction clamps or as approved by the Engineer, to prevent the fittings from being blown from the lines under pressure. Any bend greater than 22.5 degrees requires a restraint style megalugs or uniflange friction clamp. Pipe ends left

for future connections shall be valved, plugged, or capped, and anchored, as shown on the drawings or as required to complete the construction to the satisfaction of the Engineer.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Conduct a pre-installation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.7 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
D. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8 QUALITY ASSURANCE

A. Perform Work in accordance with utility company requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.1 WATER PIPE

A. Pipe (For Fire Services and for 4-in. diameter and larger pipe)
   1. Ductile iron water pipe shall be in accordance with ANSI/AWWA C151 with standard asphaltic exterior coating, cement lined in accordance with ANSI/AWWA C104, push-on elastomeric joint type conforming to ANSI/AWWA C111, (Wall Thickness Class 52) and have a minimum working pressure of 250 psi. Fittings shall be gray or ductile iron, cement lined, mechanical joint complying with ANSI/AWWA C111 requirements.
      a. Anchor pipe shall be Tyton joint style pipe as manufactured by American Pipe Products, U.S. Pipe and Foundary Co., or approved equal.
      b. Anchor Tees shall be Ductile Iron or Gray Iron fittings, 3-inch through 48-inch for water and other liquids in accordance with ANSI/AWWA C110. They shall be as manufactured by Clow, American Ductile Iron Pipe, or approved equal.
      c. Straight and Transition Couplings shall have rubber gasket joints for ductile iron in accordance with ANSI/AWWA C111 and comply with ASTM A536, Standard Specification for Ductile Iron Castings. Couplings shall be as manufactured by Smith Blair, Dresser, Ford, or approved equal.
      d. Fittings shall be in accordance with ANSI/AWWA C110 (full body) or ANSI/AWWA C153 (compact) for ductile iron and pressure rated for the same internal pressure rating of the specified pipe. Joints shall be in accordance with ANSI/AWWA C111, rubber gasket, mechanical joint.

e. Joints for pipe shall be of the mechanical or Tyton type. Joints for fittings shall be mechanical joints unless otherwise approved by the Engineer. Joints shall conform to the following:
   I) Mechanical Joints shall be of the stuffing-box type and shall conform to ANSI/AWWA Standard C111/A21.11.
   II) Tyton joints shall conform to ANSI/AWWA Standard C111/A21.11. Tyton joints shall be assembled using lubricant and jacking tools as recommended by the manufacturer. The joint shall be kept clean in all stages of assembly and disassembled and cleaned whenever in doubt as to the quality of the joint. Two bronze wedges per joint shall be placed as a final operation on each joint to provide electrical contact. Wedges shall be applied evenly and diametrically opposite each other.

2. Fasteners: All T-bolts, bolts, studs, nuts, and lugs below grade shall be 316 stainless steel or fluorocarbon coated and coated with bitumastic; All fasteners for couplings shall be 316 stainless steel or fluorocarbon coated and coated with bitumastic. Zinc caps shall be 6-ounce minimum and installed on three bolts per below grade mechanical joint (6 total per fitting/valve).
3. Bitumastic coating shall conform to AWWA C203-02 and shall be as manufactured by Roscote R28 by Royston, Koppers 300M, Tnemec 46h-413, or approved equal.
4. Polyethylene encasement shall be provided for all ductile iron pipes, unless the CONTRACTOR provides for soil testing and observations as specified below, at no additional cost to the OWNER, proving the encasement is not needed.
   a) Soil testing and observations shall evaluate the following factors to determine the corrosion potential of the ductile iron pipe in the soil.
      i. Earth Resistivity
      ii. pH
      iii. Oxidation-reduction (redox) potential
      iv. Sulfides
      v. Moisture Content
      vi. Soil description
      vii. Potential stray direct current
      viii. Experience with existing installations with the area

      Testing shall be performed at maximum intervals of 100-feet unless otherwise directed by the OWNER. The evaluation and weighted sum of each factor shall be in accordance with Appendix A for ANSI/AWWA C105. The determination of the need for polyethylene encasement for ductile iron pipe shall be based on the soil testing score.
   2) Polyethylene encasement shall conform to ANSI/AWWA C105, have a thickness of 8 mils. The pigmentation shall be natural when exposed to ultraviolet light for less than 48-hours. When exposed to ultraviolet light for 2 to 10-days pigmentation shall be 2.0 to 2.5%, well-dispersed carbon black with stabilizers. Encasement shall be as manufactured by Dupont Athalon, USI Petrothene resins, or approved equal.

3) Installation of the encasement shall consist of cutting the polyethylene tubing in lengths that are 2-feet longer that the pipe section and placing around the pipe. After pipe joint has been made, overlap joint with polyethylene tube and secure with closure tape. Fold tube over at top and secure at quarter points along the pipe section. Remove and replace all damaged tube at no additional cost to the OWNER.

B. Pipe (For Domestic Services and for 2-in. dia. and smaller pipe)
   1. Tubing: ASTM B 88 and B-68, Type K unless otherwise noted on the drawings. All piping shall meet Federal specification WW-T 7996.
   2. Fittings: Cast Bronze, Flared Type; ANSI/ASME B16.26.

2.2 HYDRANTS

A. Hydrants shall be AWWA C502, UL 246, dry barrel type for freezing conditions. They shall be 5 ½-foot bury with a 5 ¼-inch valve opening and be equipped with a standard pentagon operating nut, 1 ½-inch point to flat. Hydrants shall open counterclockwise and the minimum net water area of the barrel shall not be less than 190 percent of the barrel length. Inlet connections shall be 6-inch bell or mechanical joint with accessories, gland bolts, and gaskets.

C. Hydrant extensions shall be manufactured in 6-inch multiples, with rod and coupling to increase barrel length.

D. Hose sizes shall be to match utility company (national standard threads), and include two 2 ½-in. hose nozzles, one 4 ½-in. pumper nozzle. Pumper nozzle shall face the street.

E. Hydrants shall be finished with primer and two coats of red enamel as shown on the Contract Drawings and as approved by the Owner.

F. Acceptable hydrants include model A-423 Super Centurion by Mueller Company; or Approved Equivalent.

2.3 RESILIENT WEDGE GATE VALVES

A. The resilient seat gate valves (14-in) shall fully comply with the latest revision of C-509, and shall be UL Listed and FM Approved. The valves shall be tested and certified to ANSI/NSF 61.
   1) Operating nut shall be a 2-in square, with an arrow cast in to show direction of opening. The bolt that attaches the operating nut to the stem shall be recessed into the operating nut so not to interfere with operation.
   2) Valves shall OPEN LEFT (counterclockwise).
   3) Valves shall have a non-rising stem. The stem shall be of bronze rolled bar stock and shall have a forged thrust collar. Cast stem shall not be acceptable.
   4) Valves shall be designed for a 250 PSIG working pressure, and shall be tested to 500 PSIG.
   5) Gate valves shall have a stuffing box that is O-ring sealed. Two rings shal be placed above, and one O-ring below the stem thrust collar. Valves without a stuffing box, and three O-rings are unacceptable.
   6) The valve disc and guide lugs must be fully (100%) encapsulated in SBR rubber. The guide caps of an acetyl polymer material shall be placed over solid guide lugs to prevent abrasion and reduce operating torque.

7) The valves shall have all surfaces coated with a fusion bonded, thermo-setting powder epoxy coating of 10 mils of nominal thickness. All nuts and bolts on the body and bonnet of the valve shall be stainless steel.
8) The structural design of the valve shall be such that if excessive torgue is applied to the stem, stem failure shall occur externally at such point as to enable the operation of the valve with a pipe wrench.
9) Wall thickness of the valves shall fully comply with AWWA C-509 (Section 4.3.1, table 2) reduced wall valves are not acceptable.
10) Gate valves shall be Mueller A-2360, Kennedy, or approved equal.

2.4 BLOW-OFFS

A. Blow-offs, if required, shall be located as shown on the Contract Drawings.
B. Blow-off material shall consist of 1-in. or 2-in. brass pipe as shown on the Contract Drawings, with standard pipe threads and standard brass fittings.
C. Blow-off risers shall consist of hot dipped galvanized or copper pipe.

2.5 THRUST BLOCKS AND CONCRETE SPACERS

A. Thrust blocks shall be as specified on the Contract Drawings and constructed with Portland Cement Concrete, Class A, conforming to NYSDOT Standard Specification Section 555 and Section 501.
B. Framework shall be Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances, coated with a release agent that will not adversely affect the concrete or interfere with application of coatings. Pre-cast concrete spacer and support blocks shall be as specified on the Contract Drawings.

2.6 PLUGS

A. Plugs shall be ductile iron and shall conform to the requirements of ANSI\AWWA C110.

2.7 EXTENSION STEMS

A. Valves installed in the ground with the opening nut greater than 4-feet below grade shall have extension stems that extend to within three feet of the finished grade.
B. A centering device shall be installed in the extension stem just below the operating nut.

2.8 VALVE BOXES

A. Valve boxes shall be two piece screw type manufactured by Bibby, or approved equal.

2.9 BACKFLOW PREVENTER (RPZ-1)

A. The backflow preventer shall be lead-free reduced pressure zone type, cast copper silicon alloy body construction, with lead-free strainer, tight-seating check valve and relief assemblies. And shall also include ball valve test cocks.
B. Provide with integral body union connections, quarter-turn, full port, resilient seated, bronze ball valve shut-offs and air gap drain connection.
C. Line size as shown on drawings.
D. Design selection based on Watts Series LF009M3QT-S with Model 900-AG-F air gap drain connection, or Approved Equivalent.

2.10 BEDDING AND BACKFILL MATERIALS

A. Bedding: As specified in Section 31 23 16
B. Backfill: As specified in Section 31 23 16

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify the type and outside diameter of existing mains at connection location prior to ordering any tapping materials.
B. Examine all pipe and appurtenances for defects, etc. prior to installation.
C. Clean interior of all pipe and appurtenances and remove all foreign substances prior to installation.
D. Examine trench for rock and unstable conditions. Apply bedding as required per the Contract Drawings and Section 31 2333, Trenching and Backfill.
E. Excavate bell holes at each joint to permit the joint to be made properly and to provide uniform and continuous bearing for the pipe.

3.2 TRENCHING

A. See the sections on excavation and fill for additional requirements.
B. Hand trim excavation for accurate placement of pipe to elevations indicated.
C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide thrust restraint bearing on subsoil as detailed on Project Documents.
D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.3 INSTALLATION - PIPE

A. Install pipe at the locations and grades shown on the Contract Drawings.
B. Install piping and fittings in accordance with ANSI/AWWA C600 requirements.
C. Route pipe without exceeding maximum allowable joint deflections.
D. Form and place thrust blocks at each elbow or change of direction of the pipe main.
E. Install temporary blow-off and sampling taps to permit flushing, disinfection and testing of installed system.

3.4 INSTALLATION - HYDRANTS

A. When installing hydrants, if groundwater is encountered, as verified by the Project Representative, within seven (7)-feet of finish grade, weep holes (drains) shall be plugged.
B. Install gate valves and hydrants as indicated on the Contract Drawings.
C. Install all gate valves and hydrants in a vertical and plumb position. Backfill carefully to maintain a vertical and plumb positioning.
D. Install valve boxes in a manner that will not transmit loads, stress or shock to the valve body. Center valve box over operating nut and securely fit valve box together leaving cover flush with the finished grade surface.

3.5 CONNECTIONS TO EXISTING MAINS

A. Connections to existing water mains shall be made in a manner approved by the Owner and include dry and wet taps, as selected by the Contractor. The Contractor shall furnish and install the tap, valve, and all necessary appurtenances as required to make the connection to the existing water line. Contractor shall notify the Village Water Department a minimum two working days prior to installation of wet/dry tap on existing main.
B. All parts of the tapping equipment that will be in contact with the water in the main shall be washed in a chlorine solution before using.
C. Equipment for pressure taps shall be valved and gasketed to prevent leakage during the tapping.

3.6 FIELD QUALITY CONTROL

A. All testing of the watermain shall be conducted by the Contractor under the supervision of the Village of Mayfield Water Department.
B. All valved sections of pipe work shall be hydrostaticly tested in accordance with AWWA C600, Section 5.2. Hydrostatic testing shall be conducted after the pipe or section of pipe has been laid, thrust blocking cured (min. 5 days), and the trench is completely or partially backfilled. Pipe shall be tested at a minimum of 150-psi for a period of 2 hours. Test pressures shall not vary by more than 5-psi (+/-) throughout the duration of the test. The maximum amount of leakage per 1,000 linear feet of 14-inch diameter pipe shall be 1.16 gallons per hour.
C. All pressure and leak testing shall be in conformance with AWWA Specifications C600 for mechanical and push-on joint point.
D. The test pressure shall not exceed the rated working pressure of the valves when the preesure boundary of the test section includes closed, resilient seated gate valves.
E. Locate and repair all leaks and repeat test as necessary until test results are satisfactory and comply with the appropriate standards.
F. Furnish copies of all testing upon completion of water distribution system backfilling.
E. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION

SECTION 33 13 00

DISINFECTING OF WATER UTILITY DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 1116.

B. Testing and reporting results.

1.02 RELATED REQUIREMENTS

A. Section 33 1116 - Site Water Utility Distribution Piping.

1.03 PRICE AND PAYMENT PROCEDURES

A. Disinfection: By the linear foot. Includes preparing, disinfecting, testing, and reporting.

1.04 REFERENCE STANDARDS

A. AWWA B300 - Hypochlorites; American Water Works Association; 2011 (ANSI/AWWA B300).

B. AWWA B301 – Chlorine Gas; American Water Works Association; 2010 (ANSI/AWWA B301).

C. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651). Do not use Tablet Method therein.

D. Comply with all requirements of the New York State Department of Health for disinfection of potable water lines, valves, hydrants, and appurtanances.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Test Reports: Indicate results comparative to specified requirements.

C. Certificate: From authority having jurisdiction indicating approval of water system.

D. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.

E. Disinfection report:

1. Type and form of disinfectant used.

2. Date and time of disinfectant injection start and time of completion.

3. Test locations.

4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.

5. Date and time of flushing start and completion.

6. Disinfectant residual after flushing in ppm for each outlet tested.

F. Bacteriological report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.

2. Time and date of water sample collection.

3. Name of person collecting samples.

4. Test locations.

5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.

6. Coliform bacteria test results for each outlet tested.

7. Certification that water conforms, or fails to conform, to bacterial standards of the New York State Department of Health.

1.06 QUALITY ASSURANCE

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.

B. Testing Firm: Company specializing in testing potable water systems, certified by the State of New York.

C. Submit bacteriologist's signature and authority associated with testing.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Chlorine Gas.

2.02 TEST KITS

A. High range test kit for chlorine residual (0-200 mg/1) Hach Chemical Co. Model CN-21P.

B. DPD chlorine residual test kit (0-3.5 mg/1) Hach Chemical Co. Model CN-66.

C. Test kits to remain property of the Contractor.

PART 3 EXECUTION

3.01 PRESSURE TESTING

A. All pipes shall be tested at the pressures and rates identified on the Drawings by a third party and paid for by the Contractor. Equipment required to perform the work shall be provided and attached by the Contractor or the third party.

B. Pressure test all mains from main line valve to main line valve or tapping valve.

C. All services shall be tested up to the curb stop by opening the corporation and closing the curb stop.

D. Fill the test section of pipe full of approved quality water and remove all air from test section.

E. Maintain the test section of pipe full of water for 24 hours before the test.

F. Use a pump to raise the water pressure, based on the elevation of the lowest point of the test section, to a pressure of 150-psi.

G. Maintain the test pressure for a period of two hours. The volume of water required to maintain 150 psi pressure shall not exceed the limits defined in Section 4 of ANSI/AWWA C600.

H. Locate and repair all leaks and repeat test as necessary until test results are satisfactory and comply with the appropriate standards.

I. Furnish copies of all testing upon completion of water distribution system backfilling.

3.02 EXAMINATION

A. Verify that piping system and water well has been cleaned, inspected, and pressure tested.

B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.03 DISINFECTION

A. Flush mains with clear water at a minimum rate of 2.5 fps prior to disinfection. See Table 1.

TABLE 1 - WATER MAIN FLUSHING DATA		
PIPE DIAMETER (INCHES)	FLUSHING RATE GPM @ 2.5 fps	HYDRANT OPENINGS @ 40 psi
6	220	One – 2.5-in.
14	1250	Two – 2.5-in.

B. Chlorine Gas: Apply with a solution-feed chlorinator in combination with a booster pump for injecting the chlorine gas-water mixture into the main. Do not use direct feed chlorinators.

C. Hypochlorites: Apply solutions to water mains with a gasoline or electrically powered chemical feed pump designed for feeding chlorine solutions.

D. Application (Continuous Feed Method).

1. Connect chlorinator or force pump to water main upstream from point of repair or replacement, or new lines.

2. Proportion application rate of chlorine solution to obtain a minimum concentration of 50 mg/1 of available chlorine. Use high range test kit to determine concentration. See Table 2.

TABLE 2 - QUANTITY OF DISINFECTANT REQUIRED FOR 50 mg/l OF AVAILABLE CHLORINE PER 100 FT. OF PIPE							
PIPE DIAMETER (INCHES)	POUNDS		OUNCES			QUARTS	
	Cl GAS	SOLUTION	HYPOCHLORITE				
		70%	70%	14.7%	5.25%	14.7%	5.25%
6	0.1	0.1	1.4	6.7	18.7	0.2	0.6
14	0.4	0.5	7.6	36.3	102.0	1.2	3.2

3. In the absence of a meter, determine rate either by placing a pitot gage at discharge or by measuring the time to fill a container of known volume. See Table 3.

TABLE 3 - TIME FOR DISINFECTANT TO FLOW THROUGH 100 FT. OF PIPE - MINUTES			
PIPE DIAMETER (INCHES)	@ 25 GPM	@ 100 GPM	@ 500 GPM
6	5.9	1.5	0.3
14	32.0	8.0	1.6

4. Continue to apply chlorine solution until it reaches discharge. Check for the presence of chlorine at discharge by adding an orthotolidine reagent. In the presence of chlorine the reagent will turn red.

5. Maintain chlorinated water in the main for a minimum of 24 hours. At the end of this period chlorine concentration shall be at least 25 mg/1. Use high range test kit to determine concentration.

6. Operate all valves and hydrants to insure their proper disinfection.

7. Prevent back flow of super chlorinated water into existing distribution system.

E. Final Flushing:

1. After a 24-hour retention period, flush main until maximum chlorine concentration is 1.0 mg/1. Use DPD chlorine residual test kit.

2. Discharge super chlorinated water in a manner that will not adversely affect plants and animals. Comply with applicable State regulations for waste discharge.

F. Bacteriological Tests: Contact local health units for sampling criteria and procedures. Local health units may have more stringent criteria.

1. Test water main for bacteriological quality before putting pipe into service. A minimum of two successive sets of samples shall be taken at 24-hour intervals. Both sets of samples shall indicate bacteriological safe water before putting the facility in operation. Pay all expenses incurred for testing.

2. Tests shall be conducted by a laboratory approved by the New York State Health Dept.

G. Give all test results to Owner's Representative.

1. Should test results prove any part of the system bacteriologically unsafe, repeat disinfection procedures until satisfactory results are obtained.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000.

B. Test samples in accordance with AWWA C651.

END OF SECTION

SECTION 33 31 11

SITE SANITARY UTILITY SEWERAGE PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary sewerage drainage piping, fittings, and accessories.

B. Connection of building sanitary drainage system to municipal sewers.

C. Cleanout Access.

1.02 RELATED REQUIREMENTS

A. Section 31 23 23 – Trenching and Backfilling: Excavating of trenches.

B. Section 31 23 23 – Trenching and Backfilling: Bedding and backfilling.

C. Section 33 05 13 - Manholes and Structures.

1.03 PRICE AND PAYMENT PROCEDURES

A. Pipe and Fittings:

1. Basis of Measurement: By the linear foot.

2. Basis of Payment: Includes hand trimming excavation, bedding, pipe and fittings, connection to building service piping and to municipal sewer.

B. Cleanout:

1. Basis of Measurement: By the unit for a nominal depth of 6-feet.

2. Basis of Payment: Includes hand trimming excavating, foundation pad, unit installation with accessories, connection to sewer piping.

1.04 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.05 REFERENCE STANDARDS

A. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2012.

B. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.

C. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Material; 2012.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation with the County Highway Department when installation impacts the public right-of-way.

B. Pre-installation Meeting: Conduct a pre-installation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer’s catalog cuts, specifications, and installation instructions.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

E. Field Quality Control Submittals: Document results of field quality control testing.

F. Project Record Documents:

1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.01 SANITARY PIPES, LATERAL PIPES AND FITTINGS

A. All material specified in this section shall be new, unused, and free from defects. All pipe and fittings shall have the brand name, size, SDR or class rating, and ASTM test numbers printed on the exterior surface.

B. The pipe shall be joined with an integral bell and spigot type rubber gasket joint. The gasket shall be locked securely in place by a groove formed in the bell to prevent displacement. The "locked-in" rubber seating ring shall meet or exceed ASTM D-3212.

C. Sanitary sewer pipe shall be polyvinyl chloride pipe, PVC SDR-35 and laterals shall be 6-in minimum PVC SDR-21 sloped at ¼-in/foot (2%) minimum grade. Pipe shall be the bell and spigot type with elastomeric gasket joints supplied in standard lengths meeting ASTM D-3034. The pipe and fittings shall also meet or exceed ASTM D-1784, D-2152, and D-2444. The rubber rings shall conform to ASTM 1869 and F-477.

D. Sewer connections on new sewer main installations shall be made with either tee or wye fabricated or injection molded fittings. The minimum strength classification of these fittings shall be equal to that of the pipe and compatible with the manufacturer of the pipe.

2.02 CLEANOUTS

A. Cleanouts shall be 4-in. diameter Poly Vinyl Chloride (PVC) SDR-21 with gasketed joints meeting the requirements of ASTM Specifications D-3934 and D-3212, or as shown on the Contract Drawings.

2.03 BEDDING AND BACKFILL MATERIALS

A. Pipe Bedding Material: As specified in Section 31 20 00.

B. Pipe Backfill Material: As specified in Section 31 20 00.

PART 3 EXECUTION

3.01 GENERAL

A. Perform work in accordance with applicable code(s).

3.02 TRENCHING

A. All excavation shall be to the lines and grades shown on the Contract Drawings.

B. Any suitable excavation methods may be used but sewer trenches shall be confined to the smallest area practical for proper construction and inspection. Hand methods shall be employed where it is deemed necessary by the Owner's Representative. Where necessary, sheeting and/or bracing shall be used to provide support and stability to trench walls. Sheeting and bracing, if required, shall be designed and installed in accordance with Section 31 50 00, Excavation Support and Protection.

C. All open excavations shall be completely surrounded with barricades and illuminated at night.

3.03 INSTALLATION - PIPE

A. All sewers, sewer laterals and related structures shall be constructed to the lines and grades shown on the Contract Drawings and in accordance with the procedures shown on the Contract Drawings and installation methods described in the NYSDOT Standard Specifications for the specified materials.

B. Pipe bedding and backfill shall be placed in accordance with the procedures and at the locations shown on the Contract Drawings and in conformance with the material specifications contained in Section 31 23 23, Trenching and Backfilling.

C. All pipes and fittings shall be handled carefully. Pipes and fittings shall not be dumped or dropped while unloading or during placement in the trench.

D. The Contractor shall take all necessary precaution to insure the stability of any stockpile or individual length of pipe that is stored. Pipe stored along a road or sidewalk shall be placed so that it does not create a safety hazard or impair the free flow of traffic.

E. Materials shall be stored neatly and protected against deterioration. Materials which are rejected by the Owner's Representative shall be immediately removed from the site.

F. The interior of each pipe shall be cleaned before adding the next length.

G. The joint surfaces of all pipes and fittings shall be clean, and shall fit together to form a tight joint. When setting pipe the workmanship and tools used shall be such that the quality and strength of the pipe is not impaired.

H. Jointing shall be accomplished in conformance with the manufacturer's recommendations. Lubricant used at the joint shall be water soluble, non-toxic, non-supporting of bacteria growth and have no deteriorating effects on the pipes or gaskets. Sewer pipe shall be laid upgrade with spigots placed in the direction of the flow. The pipes shall be fitted together to form a smooth, even invert. Sewer pipe shall be laid in a straight line with a constant grade between manholes. Each pipe shall be checked for line and grade as it is laid, before the joint is made. Pipes disturbed after having been laid shall be taken up and re-laid.

I. All pipes shall be laid true to line and grade with bells up-stream and shall have a full, firm and even bearing. Boulders or other natural obstructions shall not be considered cause for varying from true line and grade.

J. The pipe shall be set carefully to line and grade using laser type grade control. Laser equipment shall be set up using at least two grade stakes as elevation and alignment references.

K. No pipe shall be laid during adverse weather conditions, as determined by the Owner's Representative. In no case shall pipe be laid in water. In cases where sewers are being installed in wet conditions or below the ground-water table so that installed pipes become submerged overnight, sufficient backfill shall be placed to prevent the pipe from becoming buoyant.

L. The ends of all laterals shall be plugged or capped to hold pressure while testing, and marked with a 2-inch x 4-inch witness stake extending from the pipe to a point 2-feet above the ground. The top of witness stake shall be painted green.

M. A record shall be kept of the location of all laterals and this information shall be shown on the "as-built" plans.

N. Pipe cleanouts and caps shall be placed at the locations shown on the Contract Drawings. Top of the cleanout or cast iron cover shall be installed flush with finished grade.

3.04 INSTALLATION - CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.05 FIELD QUALITY CONTROL

A. The Contractor shall provide all necessary materials, equipment, and qualified personnel to conduct testing on all installed sewers, manholes, and existing structures modified for connection, as specified in Paragraphs 3.7 and 3.8 below. The Contractor shall give the Owner's Representative notice at least three (3) working days prior to scheduling any testing.

B. Testing shall be in accordance with the specifications herein and Section 33.85 of the "Recommended Standards for Waste Water Facilities", 2004 Edition and subsequent editions.

C. Test sections shall be no greater than 300-feet in length.

D. To ensure proper alignment, laser or lamping of all sewers shall be performed.

E. Sewers shall be checked to determine whether any displacement of the pipe has occurred. The test shall be conducted after the final backfill has been in place at least 30-days. No pipe shall exceed a deflection of 5%. If the deflection tests are to be run using a riding ball or mandrel, it shall have a diameter equal to 95% of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

F. The Contractor shall have the option to perform hydrostatic testing, depending on the depth of groundwater, or low pressure air testing for gravity sanitary sewer lines. If the Contractor selects hydrostatic testing, it shall furnish the necessary equipment and personnel for determination of groundwater conditions at the time of the test. The selected method shall be performed as described below.

    1. Hydrostatic Testing
        a. Testing shall be conducted for a minimum test period of 24-hours.
        b. Exfiltration testing shall be performed where no groundwater exists below the invert of the pipe at the time of the hydrostatic test, as follows:
            1) The sewers and building connections shall be subjected to an internal water pressure test to the extent deemed necessary by the Project Representative to determine their water tightness.

2) The lower end of each section shall be tightly plugged and the line filled with water. The line shall be vented to allow the air to escape from the pipe and the water level shall be brought to a point two feet above the crown of the pipe at its upper end at a manhole. The two-foot head of water at the upper end shall be maintained for at least one hour.

c. Infiltration testing shall be performed where groundwater exists above the crown of the pipe at the time of the hydrostatic test, as follows:
   1) The test shall be performed after backfilling has been completed and sufficient time has elapsed to permit the groundwater to rise to its normal level.
   2) The Contractor shall erect a temporary bulkhead to shut off flow from above the section being tested, and shall provide pumps downstream of the measuring device to keep the system drained for the period of the test.
   3) The test shall be made by using an approved low head measuring weir placed at the lower end of the section to be tested or by other approved methods.

d. The maximum allowable leakage shall be 100 gal./mile/24 hours per one inch of internal diameter of the sewer.

2. Low Pressure Air Testing (gravity sewer lines)
   a. Air pressure testing shall be run following the guidelines of uni-bel (uni-b-6-79) "recommended practice: for low pressure air testing of installed sewer pipe".
   b. All branch fittings and ends shall be securely plugged to withstand the internal test pressures. The section of line being tested shall also be securely plugged at each manhole. All stoppers shall be adequately branched when required.

G. After the above tests are satisfied, a video tape recording of the sewers shall be created. A copy of the tape shall be submitted to the Owner for its inspection and records.

3.06 REJECTION AND REPAIR

A. Any section of sanitary sewer piping which does not meet the specified leakage test shall be repaired.

B. The Contractor shall make all necessary repairs and retest all repaired sewers and manholes, at no additional cost to the Owner.

3.07 PROTECTION

A. Care shall be taken at all times to avoid entrance of mud and water into existing sewers. When connecting to an existing manhole, the connection shall be tightly plugged until completion of the work. At that time, the plug shall be removed and the accumulated water and mud pumped out of the manhole under the observation of the Owner's Representative. The cost of any necessary cleaning or flushing of existing facilities caused by failure to comply with this specification or for other reasons shall be at the Contractor's expense.

B. At the end of each working day (or any other time of work stoppage), the upstream end of the pipe shall be tightly plugged to prevent entrance of mud, silt or muddy water.

END OF SECTION

SECTION 33 39 14

PRECAST CONCRETE WASTEWATER STRUCTURES (SANITARY)

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthmoving: Section 31 20 00.

B. Site Sanitary Utility Sewerage Pipe: Section 33 31 11.

1.02 DESIGN REQUIREMENTS

A. Design: In accordance with ASTM C890 - Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.

B. Loading: AASHTO HS20 with 30 percent impact and 130 lb/cu ft equivalent soil pressure.

1.03 SUBMITTALS

A. Waiver of Submittals: The "Waiver of Certain Submittal Requirements" in Section 01 33 00 does not apply to this Section.

B. Product Data: Catalog cuts with dimensions, weights, and fabrication details and product specifications.

PART 2 PRODUCTS

2.01 SEPTIC TANK

A. Type: Heavy duty precast concrete.

B. Working Capacity: 3,100 gallons.

C. Tank Configuration: Rectangular with effective tank length not less than two nor more than four times the effective width.

1. When the effective length of the tank exceeds nine feet, provide reinforced 4-inch thick concrete baffle wall to create two compartments within the septic tank. The inlet compartment shall contain 65 to 75 percent of the total tank capacity. The baffle (transverse wall) shall extend from the bottom of the tank to at least 6 inches above the liquid level. The baffle shall have a 6-inch by 18-inch slot located 18 inches below the liquid surface. Provide a minimum 6-inch air space between the top of the baffle and the underside of the top of the tank to permit venting.

2. Minimum Liquid Depth: 4-feet.

D. Pipe Connections:
1. Cut or cast openings in tank 2-inches larger than the outside diameter of the connecting pipe.
2. There shall be a minimum 3-inch difference in elevation between the inverts of the inlet and outlet piping.
3. Inlet and outlet piping shall be provided with sanitary tees or concrete baffles. The inlet tee shall discharge to the tank 15-inches below the liquid surface. The outlet tee shall draw from the tank 18-inches below the liquid surface. Baffles shall be of like dimensions.

E. Manholes:
1. Provide at least one access manhole per tank compartment. The access manhole opening shall have a minimum 24-inch clear opening.
2. Provide inspection manholes, 1 sq ft nominal size, over inlet and outlet pipe connections. Inspection manholes shall have concrete plug type covers. The placement of an access manhole over a pipe connection will eliminate the need for an inspection manhole at that location.

2.02 DOSING TANK

A. The tank and siphon shall provide a maximum 101-gallon dose per discharge.

B. Dosing Siphon: Provide (two alternating) dosing siphon(s). The dosing siphon shall be constructed of (PVC) and meet the following size and flow capacity criteria:

SIZE (INCH)	AVE. DISCHARGE RATE (gpm)	MIN. DISCHARGE RATE (gpm)	MAX. DISCHARGE RATE (gpm)
3	72	48	96
4	165	102	227
5	328	234	422
6	472	340	604
8	950	500	1400

C. Pipe Connection Opening: Cut or cast 2 inches larger than the outside diameter of the connecting pipe.
1. Inlet: Set inlet invert a minimum of 3 inches above the maximum high- water level within the tank.
2. Vent: Provide opening for vent pipe off of siphon discharge. Set invert of vent pipe 1 inch below inlet piping invert.

D. Siphon Cutout: Sized for siphon provided.

E. Access Manholes: Minimum 24-inch clear opening centered over each siphon.

F. Inspection Manhole: 1 sq ft nominal size, place over tank inlet piping connection. Provide tapered concrete plug cover.

2.03 DISTRIBUTION BOX

A. Configuration: As shown on the drawings with proper inlet and outlet openings.

B. Covers: Removable concrete.
   1. Covers on boxes designed for traffic loadings shall be provided with tapered concrete inspection plugs.

C. Boxes shall be provided with inlet baffles. Where dimensions of the distribution box prohibit the casting of a concrete baffle, the baffle shall be field constructed with brick and mortar.

D. Pipe Connections Openings:
   1. General: Size openings 2 inches larger than the outside diameter of the connecting pipe.
   2. Inlet: Cut or cast opening during fabrication of the box.
   3. Outlet: Provide sufficient knockouts or knockout panel areas for (6) six active and (3) three future 4-inch distribution lines.
   4. There shall be a minimum 2-inch difference in elevation between the inverts of inlet and outlet piping.

E. Outlet inverts shall be 1 to 5 inches above the distribution box floor to allow water leveling of the box.

2.04 MISCELLANEOUS MATERIALS

A. Concrete for Precast Structures: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength, 4,000 psi after 28 days.

B. Reinforcing Steel:
   1. Welded Wire Fabric: ASTM A497.
   2. Steel Bars: ASTM A615.

C. Access Manhole Frames and Covers:
   1. Frames: Round, cast iron, minimum weight 380 pounds. Unless otherwise indicated, the frame shall be 9 inches high with a minimum 21-inch clear opening.
   2. Covers: Cast iron, 1-3/4 inches thick, minimum weight 160 pounds, reinforced or ribbed on the underside and without perforations. The top surface shall be checkered and provided with suitable lifting notches.

3. Machining: Seats of manhole frames and covers shall be machined to a horizontal bearing surface.

D. Precast Reinforced Concrete Manhole Riser Sections: ASTM C478.

E. Manhole Brick: ASTM C32, Grade MS.

F. Concrete Masonry Units for Manholes: ASTM C 139.

G. Butyl Rope Sealant: Federal Specifications SS-S-210A.

H. Mortar: ASTM C270, Type M.

I. Non-shrink Grout: Water Plug, Hallemite Manhole Pipe Cement or grout utilizing Sika Set.

J. Pipe and Fittings: Cast iron soil pipe, ASTM A74.

K. Coal Tar Epoxy Coating: Two component, polyamide cured, 68 percent solids by volume.
1. Acceptable Coating: Hi-Mil Sher-Tar B6940 by The Sherwin-Williams Company.

L. Cast-In-Place Concrete (for encasing siphons): 5 percent air entrained, 3000 psi minimum compressive strength.

PART 3 EXECUTION

3.01 INSTALLATION OF SEPTIC TANK

A. Construct the septic tank with precast concrete sections on a compacted, 6 inch leveling bed of sand or broken stone at required location and elevations. Seal construction joints with butyl rope sealant.

B. Extend access manholes approximately to grade utilizing brick, concrete masonry units or precast concrete riser sections. The extensions shall finish so that the tops of cast iron manhole frames and covers will be flush with grade.
1. Install sewer brick, concrete masonry units, and precast concrete riser sections with full beds of mortar.
2. Plaster interior and exterior surfaces of brick and concrete masonry extensions smooth with a minimum 1/2 inch thickness of mortar.

C. Install cast iron manhole frames and covers to finish flush with grade. Set frames in a full bed of mortar.

D. Make piping connections to septic tank. Set piping and sanitary tees at required elevations. Fill annular space between pipe and structure with non-shrink grout to provide a watertight joint.

E. Fill lifting holes and unused knockouts with non-shrink grout.

F. Paint cast iron manhole frames and covers with two coats of coal tar enamel prior to installation. Touch-up as required following installation.

G. Paint interior of septic tank, including baffles and access manhole extensions, from a point 12 inches below the normal liquid surface to the top of the access manhole extensions with two coats of coal tar epoxy applied at 8-12 mils DFT per coat.

3.02 INSTALLATION OF DOSING TANK

A. Construct the dosing tank with precast concrete sections on a compacted, 6 inch leveling bed of sand or broken stone at required location and elevation. Seal construction joints with butyl rope sealant.

B. Set dosing siphons at required elevations. Make discharge and air vent pipe connections. Secure assembly from movement and encase trap and discharge pipe with 3,000 psi concrete. Install siphon bell and air piping in accordance with siphon manufacturer's written instructions.
   1. Fill siphon traps with clean water.

C. Make inlet and vent pipe connections to tank. Fill annular space with non-shrink grout to provide a watertight seal between pipe and structure.

D. Extend access manholes approximately to grade utilizing brick, concrete masonry units or precast concrete riser sections. The extensions shall finish so that the tops of the cast iron manhole frames and covers will be flush with grade.
   1. Sewer brick, concrete masonry units and precast concrete riser sections shall be installed with full beds of cement mortar.
   2. Plaster interior and exterior surfaces of brick and block extensions smooth with a minimum 1/2 inch thickness of cement mortar.

E. Install cast iron frames and covers to finish flush with grade. Set frames in full bed of cement mortar.

F. Fill lifting holes and unused knockouts with non-shrink grout.

G. Reduce dosage of tank by placing solid concrete masonry units within tank. Exercise care to avoid damage to siphons.

H. Paint cast iron manhole frames and covers with two coats of coal tar enamel prior to installation. Touch-up as required following installation.

I. Paint interior concrete surfaces of dosing tank, including underside of top slab and interior of access manhole extensions, with two coats of coal tar epoxy applied at 8-12 mils DFT per coat.

J. Test siphons in accordance with the manufacturer's written instructions. Adjust siphons as required and leave in proper operating condition.

END OF SECTION

SECTION 33 41 11

SITE STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Storm drainage piping, fittings, and accessories.

B. Connection of drainage system to municipal sewers.

1.02 RELATED REQUIREMENTS

A. Section 32 13 13 – Concrete Paving: Concrete for cleanout base pad construction.

B. Section 31 23 23 - Excavation: Excavating of trenches.

C. Section 31 23 23 - Trenching: Excavating, bedding, and backfilling.

D. Section 31 23 23 - Fill: Bedding and backfilling.

E. Section 33 05 13 - Manholes and Structures.

1.03 PRICE AND PAYMENT PROCEDURES

A. Pipe and Fittings:

1. Basis of Measurement: By the linear foot.

2. Basis of Payment: Includes hand trimming excavation, bedding and backfilling, pipe and fittings, connection to building service piping and to municipal sewer.

1.04 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.05 REFERENCE STANDARDS

A. AASHTO M 252 - Standard Specification for Corrugated Polyethylene Drainage Pipe; 2009.

B. AASHTO M 294 - Standard Specification for Corrugated Polyethylene Pipe, (12- to 60- in.) Diameter; 2013.

C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

D. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2012).

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of piping with size, location and installation of service utilities.

B. Pre-installation Meeting: Conduct a pre-installation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating pipe, and pipe accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

E. Field Quality Control Submittals: Document results of field quality control testing.

F. Project Record Documents:

1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.08 REGULATORY REQUIREMENTS

A. Conform to applicable code for materials and installation of the Work of this section.

PART 2 - PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Provide products that comply with applicable code(s).

B. HDPE stormwater sewer and culvert piping shall be as required to meet the requirements of NYSDOT Specification §706-12 Smooth Interior Corrugated Polyethylene Pipe and conform to AASHTO M-294 (12 to 36-inch diameter), unless specified otherwise on the Contract Drawings.

C. Plastic Pipe (4-inch and 6 inch Diameter, Solid and Perforated) for Building Drains, Cleanout Pipes, Discharge Lines, Leaching Fields, Drain Tiles, etc: PVC meeting ASTM D 2241 or SR (Styrene Rubber) meeting ASTM D 2852.

D. Solvent cements used for joining plastic pipe and fittings shall meet ASTM designation D 2564.

E. All material specified in this section shall be new, unused, and free from defects. All pipe and fittings shall have the brand name, size, AASTHO Type or rating, ASTM criteria and other appropriate manufacturing information printed on the exterior surface.

F. Acceptable Manufacturer's include:

1. HDPE: Advanced Drainage Systems, Inc.; 3300 Riverside Dr., Columbus, OH 43221; (614) 457-3051.

2. HDPE: Hancor, Inc.; 401 Olive St., Findlay, OH 45840; (800) 847-5880.

3. PVC: Thermal Pipe Systems, Inc.; 5205 W. Woodmill Dr., Wilmington, DE 19808; (302) 999-1588.

4. Or Approved Equivalent.

G. Pipe-to-Manhole/Drainage Structure Connections - one of the following:

1. A-Lok Flexible Connector by A-Lok Products, Inc., 697 Main St., Tullytown, PA 19007, (215) 547-3366.

2. Lockjoint Flexible Connector by Chardon Rubber Company, 373 Washington St., Chardon, OH 44024, (216) 285-2161.

3. Kor-N-Seal Flexible Connector by NPC, Inc., 250 Elm St., Milford, NH 03055, (601) 673-8680.

4. Link-Seal Flexible Connector by Thunderline Link-Seal, Inc., 6525 Goforth St., Houston, TX 77021, (713) 747-8819.

5. Cement mortar in accordance with ASTM C270.

H. Coupling Bands: Galvanized steel, 0.052 inches thick x 10 inches wide; connected with two neoprene "O" ring gaskets and two galvanized steel bolts.

2.02 PIPE ACCESSORIES

A. Pipe Joints: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene ribbed gasket for positive seal.

B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

C. Filter Fabric: Non-biodegradable, woven. Provide Mirafi 550X manufactured by Tencate, or approved equivalent.

D. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Storm Sewer Service " in large letters.

2.03 ATHLETIC FIELD DRAINAGE MATERIALS

A. Flat panel drains: panel drains shall consist of geo-composite panels meeting the following criteria:
   1. Geotextile – Needle punched, non-woven with elongation (ASTM D-4632-91) 50%; Grab Tensile (ASTM D-4632-92) 120 lbs; Flow Rate (ASTM D-4491) 135 gal/min/ft^2.
   2. Core HDPE with Compressive strength (ASTM D-695/1621) 11,400 PSF; Flow Rate (ASTM D-47162) 21 GPM/ft width; and Peel Strength (ASTM D-1876) 50 lbs/ft width.

2.04 BEDDING AND BACKFILL MATERIALS

A. Bedding: As specified in Section 31 23 23 – Trenching and Backfilling.

B. Backfill: As specified in Section 31 23 23 – Trenching and Backfilling.

PART 3 - EXECUTION

3.01 TRENCHING

A. All excavation shall be to the lines and grades shown on the Contract Drawings.

B. Any suitable excavation methods may be used but sewer trenches shall be confined to the smallest area practical for proper construction and inspection. Hand methods shall be employed where it is deemed necessary by the Owner's Representative. Where necessary, sheeting and/or bracing shall be used to provide support and stability to trench walls. Sheeting and bracing, if required, shall be designed and installed in accordance with Section 31 50 00 - Excavation Support and Protection.

C. See Section 31 23 23 - Trenching for additional requirements.

D. Hand trim excavation for accurate placement of pipe to elevations indicated.

E. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

A. All sewers, sewer laterals and related structures shall be constructed to the lines and grades shown on the Contract Drawings and in accordance with the procedures shown on the Contract Drawings and installation methods described in the NYSDOT Standard Specifications for the specified materials.

B. Pipe bedding and backfill shall be placed in accordance with the procedures and at the locations shown on the Contract Drawings and in conformance with the material specifications contained in Section 31 23 23 - Trenching and Backfilling.

C. All pipes and fittings shall be handled carefully. Pipes and fittings shall not be dumped or dropped while unloading or during placement in the trench.

D. The Contractor shall take all necessary precaution to insure the stability of any stockpile or individual length of pipe that is stored. Pipe stored along a road or sidewalk shall be placed so that it does not create a safety hazard or impair the free flow of traffic.

E. Materials shall be stored neatly and protected against deterioration. Materials which are rejected by the Owner's Representative shall be immediately removed from the site.

F. The interior of each pipe shall be cleaned before adding the next length.

G. The joint surfaces of all pipes and fittings shall be clean, and shall fit together to form a tight joint. When setting pipe the workmanship and tools used shall be such that the quality and strength of the pipe is not impaired.

H. Jointing shall be accomplished in conformance with the manufacturer's recommendations. Lubricant used at the joint shall be water soluble, non-toxic, non-supporting of bacteria growth and have no deteriorating effects on the pipes or gaskets. Sewer pipe shall be laid upgrade with spigots placed in the direction of the flow. The pipes shall be fitted together to form a smooth, even invert. Sewer pipe shall be laid in a straight line with a constant grade between manholes. Each pipe shall be checked for line and grade as it is laid, before the joint is made. Pipes disturbed after having been laid shall be taken up and re-laid.

I. All pipes shall be laid true to line and grade with bells up-stream and shall have a full, firm and even bearing. Boulders or other natural obstructions shall not be considered cause for varying from true line and grade.

J. The pipe shall be set carefully to line and grade using laser type grade control. Laser equipment shall be set up using at least two grade stakes as elevation and alignment references.

K. No pipe shall be laid during adverse weather conditions, as determined by the Owner's Representative. In no case shall pipe be laid in water. In cases where sewers are being installed in wet conditions or below the ground-water table so that installed pipes become submerged overnight, sufficient backfill shall be placed to prevent the pipe from becoming buoyant.

L. The ends of all laterals shall be plugged or capped to hold pressure while testing, and marked with a 2-inch x 4-inch witness stake extending from the pipe to a point 2-feet above the ground. The top of witness stake shall be painted green.

M. A record shall be kept of the location of all laterals and this information shall be shown on the "**As-built**" plans.

N. Pipe cleanouts and caps shall be placed at the locations shown on the Contract Drawings. Top of the cleanout or cast iron cover shall be installed flush with finished grade.

3.03 FIELD QUALITY CONTROL

A. The Contractor shall provide all necessary materials, equipment, and qualified personnel to conduct testing on all installed sewers, manholes, and existing structures modified for connection, as specified in Paragraphs D and E below. The Contractor shall give the Owner's Representative notice at least three (3) working days prior to scheduling any testing.

B. Testing shall be in accordance with the specifications herein and Section 33.85 of the "Recommended Standards for Waste Water Facilities", 2004 Edition and subsequent editions.

C. Test sections shall be no greater than 300-feet in length.

D. To ensure proper alignment, laser or lamping of all sewers shall be performed.

E. Sewers shall be checked to determine whether any displacement of the pipe has occurred. The test shall be conducted after the final backfill has been in place at least 30-days. No pipe shall exceed a deflection of 5%. If the deflection tests are to be run using a riding ball or mandrel, it shall have a diameter equal to 95% of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

F. After the above tests are satisfied, a video tape recording of the sewers shall be created. A copy of the tape shall be submitted to the Owner for its inspection and records.

G. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.04 REJECTION AND REPAIR

A. Any section of sanitary sewer piping which does not meet the specified leakage test shall be repaired.

B. The Contractor shall make all necessary repairs and retest all repaired sewers and manholes, at no additional cost to the Owner.

3.05 PROTECTION

A. Care shall be taken at all times to avoid entrance of mud and water into existing sewers. When connecting to an existing manhole, the connection shall be tightly plugged until completion of the work. At that time, the plug shall be removed and the accumulated water and mud pumped out of the manhole under the observation of the Owner's Representative. The cost of any necessary cleaning or flushing of existing facilities caused by failure to comply with this specification or for other reasons shall be at the Contractor's expense.

B. At the end of each working day (or any other time of work stoppage), the upstream end of the pipe shall be tightly plugged to prevent entrance of mud, silt or muddy water.

END OF SECTION

DIVISION 34 – TRANSPORTATION

SECTION 34 71 15

STEEL PIPE BOLLARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Stationary Bollards.

1.02 RELATED REQUIREMENTS

A. Section 32 13 13 – Concrete Paving.

B. Section 31 20 00 - Earthmoving.

1.03 REFERENCES

A. Standard: American Concrete Institute, ACI 301- 89, for concrete Work of this Section, unless otherwise indicated on the Drawings or specified.

1.04 SUBMITTALS

A. General: Submittals shall be made according to the conditions of the Contract and Division 01 Specifications Sections.

B. Submit proposed material specifications for all pipe bollards, covers, and concrete fill.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel Pipe: Standard weight, Schedule 40, black or galvanized; ASTM A53 or ASTM A135.

B. Bumper Post Sleeve: Model 1737 by Eagle Manufacturing Company, 2400 Charles Street, Wellsburg, WV 26070, (304) 737-3171, www.eagle-mfg.com. Or approved equal.

1. Color: Yellow.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Set pipe in center of hole and brace plumb.

B. Confirm that top of pipe is set at appropriate elevation above proposed finished grade; tolerance 1-inch +/-.

C. For stationary bollards, fill annular space around pipe and the space inside the pipe with concrete. For removable bollards, set receiver sleeve.

D. Remove braces after concrete has set.

E. Install bumper post sleeve in accordance with the manufacturer's printed instructions.

F. Install two Torx center pin security machine screws at the base of the bumper post sleeve to fasten sleeve to steel pipe.

END OF SECTION